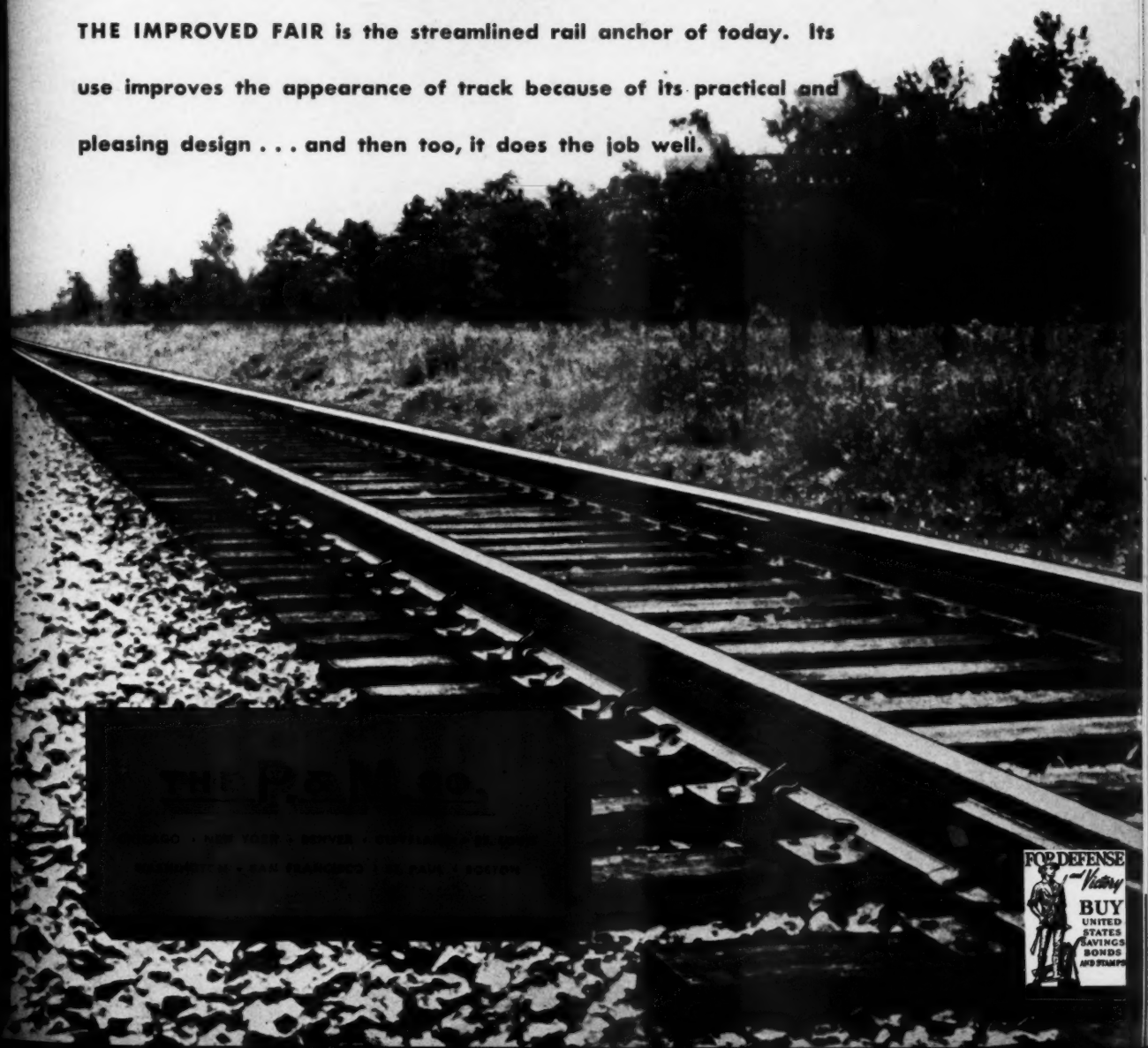
For Appearance PLUS

THE IMPROVED FAIR is the streamlined rail anchor of today. Its use improves the appearance of track because of its practical and pleasing design . . . and then too, it does the job well.



FOR DEFENSE and Victory BUY UNITED STATES SAVINGS BONDS AND STAMPS

Reliance HY-CROME *Spring Washers*

The Superior Quality of **HY-CROME** Alloy Spring Washers has been achieved through twenty-five years of periodic improvement. The experience in meeting **HEAVY RAILROAD USAGE** finds them fit to do the important job of keeping bolts tight on **TANK—COMBAT CAR** and **HEAVY ORDNANCE EQUIPMENT** and still help keep the railroads rolling. **HY-CROME** Alloy Spring Washers are made in all sizes. Write for samples and data.

★ **BUY WAR BONDS AND STAMPS** ★

EATON MANUFACTURING COMPANY

RELIANCE SPRING WASHER DIVISION

MASSILLON, OHIO

Sales Offices: New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

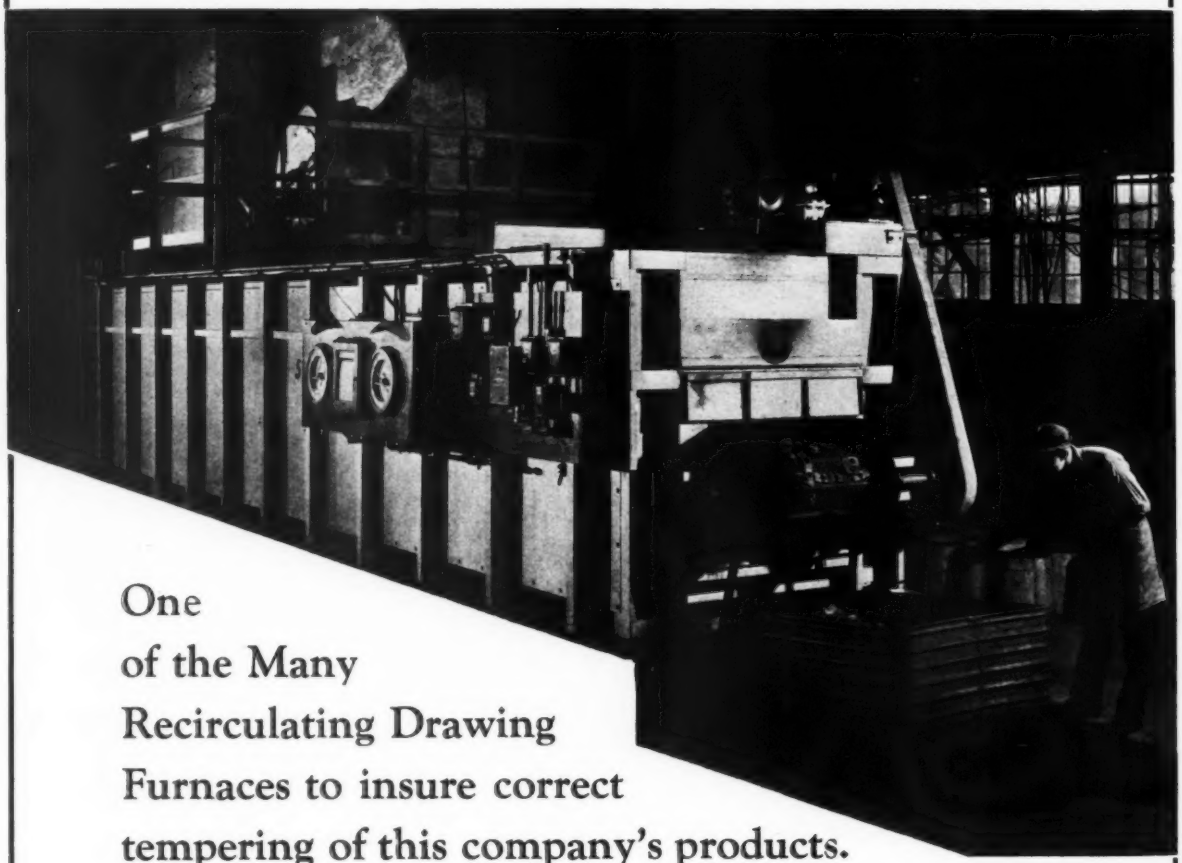
NEWSWEEK JUNE 22, 1942
76
Perspective
"AT EASE" FOR 23 YEARS
• Suddenly the order is given to recommission for immediate sailing.
• 23 Years ago, during the laying up operation, cooperative engineering service resulted in the selection of technically designed NO-OX-ID rust preventive materials and their proper application.
• This foresight undoubtedly expedited putting these ships back into service without delay.
• If you have a rust or corrosion problem, or if your need is to protect steel equipment or parts for shipment, at home or overseas, under present unusually severe conditions, consult Dearborn.
YOUR PROBLEM
LABORATORY STUDY
ENGINEERING SERVICE
NO-OX-ID
IRON RUST
The Original Rust Preventive
DEARBORN CHEMICAL COMPANY
NO-OX-ID Division, 310 S. Michigan Avenue
Chicago, Illinois
NO-OX-ID
carries on in the War Industries
A QUARTER of a century ago, NO-OX-ID had already made a name for itself as the superior rust preventive material on the railroads for the protection of bridges, water tanks, rail joints, and all ferrous metal equipment and structures. The railroads were first to benefit by its use.
Then World War No. 1 came along and NO-OX-ID entered war service to manacle that great industrial enemy—RUST. Based on performance, it has been growing in popularity ever since.
To make sure that every manufacturer knows about it and what it can do to help win this war, some of the amazing performance records it has accomplished are being published in a new series of advertisements to appear every fourth week on the last inside page of Newsweek. The first advertisement in this series is reproduced here.
War industries will undoubtedly use more and more NO-OX-ID;
. . . but there will always be plenty for the railroads!
Dearborn Chemical Company, Dept. V, 310 S. Michigan Ave., Chicago, Ill.
New York • Los Angeles • Toronto

WOODINGS-VERONA TOOL WORKS

VERONA, PA.

Since 1873

Specialists in the Manufacture of Spring Devices for Track



One
of the Many
Recirculating Drawing
Furnaces to insure correct
tempering of this company's products.

TSA Railway Exhibit Roadmasters Association
EXHIBITOR
HOTEL STEVENS
CHICAGO
SEPT. 14-17 1942

WOODINGS-VERONA TOOL WORKS

VERONA, PA. *Offices Principal Cities* CHICAGO, ILL.

HOWARD N. POTTS MEDAL
FOR DISTINGUISHED WORK IN SCIENCE OR THE MECHANIC ARTS
AWARDED BY THE FRANKLIN INSTITUTE TO HARCOURT COLBORNE DRAKE 1942 FOR THE DEVELOPMENT OF THE RAIL FISSURE DETECTOR CAR
SPERRY RAIL SERVICE
DETECTOR CAR
S.R.S. 128
S.R.S. 128

Excerpt from report of the Franklin Institute, April, 1942:

"In consideration of inventions and important work in the development of the rail fissure detector car, affording valuable results in the saving of life and property, the FRANKLIN INSTITUTE awards its HOWARD N. POTTS MEDAL to Harcourt C. Drake,* of Hempstead, Long Island, N.Y."

**Director of Research, Sperry Rail Service*

You Can HAVE BETTER TRACK AT LOWER COST

. . . if You Are Using

BARCO UNIT TYTAMPERS!

They do a BETTER JOB *Quicker*

IN OUT OF FACE or SPOT TAMPING
Each Unit is Self-Contained and
Easily Carried by ONE MAN
No Auxiliary Equipment is Needed

NOW 88 RAILROADS USE BARCO
Six Years Satisfactory Service

Initial capital expense is lower and year-around performance in tamping, crib busting and ice breaking, add to their efficiency.

TSA Track Exhibit Roadmasters Association EXHIBITOR HOTEL STEVENS CHICAGO SEPT. 14-17 1942

Showing Power Plant—costing less than $100.00 and weighing less than 100 lbs. operating group of 12 BARCO Tytampers for out of face tamping.

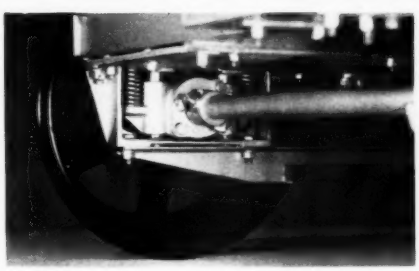
BARCO MANUFACTURING COMPANY
1805 W. Winnemac Ave. Chicago, Illinois
In Canada:
THE HOLDEN COMPANY LTD
Montreal Moncton Toronto Winnipeg Vancouver

Fairmont 1 TO 2 MEN INSPECTION CARS

FAIRMONT M9 SERIES D

One to Two Men — 500-lb. Load Capacity

Performance ON THE JOB COUNTS



CUSHIONED RIDE spring mountings permit axles to move independent of chassis, similar to "knee action." This practically eliminates rail-joint shock.

REINFORCED LIFT HANDLES and rail skids make it easy for one man to remove the car from the rails.

Combine Light Weight and Economy with *Unsurpassed Safety*

Division superintendents, road masters, section foremen, signal inspectors and others who travel alone or with an assistant, appreciate the advantages of Fairmont 1 to 2 men inspection cars. Regardless of the model selected, they are certain of ample power for dependable performance under all conditions. Fairmont's famous endless cord belt drive, with either the roller-bearing or ball-bearing Fairmont 5 to 8 horsepower engine, assures smooth starting and abundant power regardless of steep grades or strong winds. The M9, with tool trays on both sides, meets most requirements. All Fairmont inspection cars are light in weight and are equipped with four-wheel brakes and extension lift handles for easy, fast removal from the tracks. For complete details, write Fairmont Railway Motors, Inc., Fairmont, Minnesota.

OF ALL THE CARS IN SERVICE TODAY

More Than Half are Fairmonts

O E M Photo by Palmer, in an Allegheny Ludlum plant

. . . But Not to Hitler's Taste

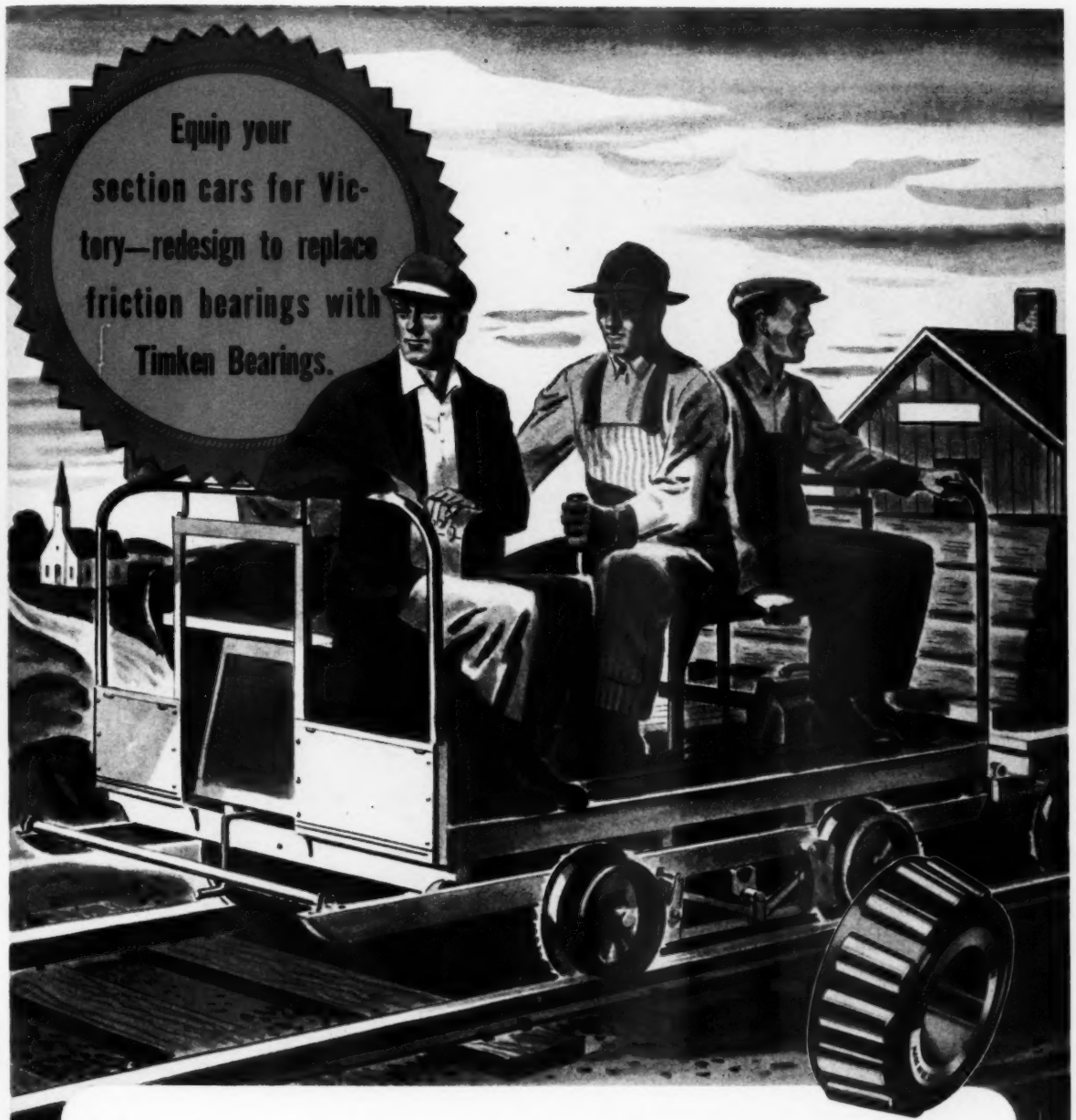
WAR'S emphasis is on *strength,* in men and in steel. That trite little truism is all pictured for you above, where the last admixture of alloys is going into an Allegheny Ludlum electric furnace.

In the shortest possible time after the arc is struck, that batch of alloy steel will be war material in use. It may be stainless bomb racks or ammunition chutes; tool steels fashioning a tank; valves or nitrided shafts in engines; electrical steels in gun and engine controls. Whatever it is, Hitler definitely won t like the taste of it. Nor will Tojo.

But let's make sure it takes the least amount of time to turn out these finished war goods. And let's not waste, unnecessarily, a single pound of vital alloys in the process.

To help engineers and production men toward more efficient fabrication and use of alloy steels, and to aid in the instruction of training classes, we have developed a wide list of printed aids. They're especially valuable for assisting "conversion" plants to avoid pitfalls and get under way. Just tell us your alloy steel problems, and let us help you find the answers.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA



Half the battle in track work is getting to the job quickly — especially in an emergency. Section motor cars and trailers equipped with Timken Tapered Roller Bearings have the necessary speed, plus safety, endurance and low upkeep cost.

Like modern main line locomotives, cars and high speed trains, Timken Bearing Equipped section cars are never troubled with hot boxes, require very little lubricating attention; have minimum starting resistance.

Give your maintenance crews the benefit of modern transportation; conserve their time; reduce track repair cost.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

SOLID CONCRETE BRIDGE DECKS

speed construction of army supply tracks

AND KEEP HIGHWAYS OPEN

Rapid, but permanent construction was the first problem in connecting the Army's Atlanta General Depot by single track to the Southern Railway and the Central of Georgia Railway.

Second problem was to build a bridge in this track without interrupting heavy daily traffic on busy U. S. Highway 42.

Solution to both problems was construction of a solid deck concrete bridge. Deck slabs were precast near the site while abutments were being built. The slabs were slipped into place during a 6-hour period—the only delay to highway traffic on the whole project.

With rails fastened directly to the slab, the track was ready for service.

In many other ways, concrete is helping the railroads keep supplies rolling for American defense.

•

PORTLAND CEMENT ASSOCIATION
Dept. 7-27, 33 W. Grand Ave., Chicago, Ill.

BUY WAR SAVINGS STAMPS AND BONDS...SUPPORT THE RED CROSS

These TWO BUDA MOTOR CARS *Assure Greater* SAFETY—COMFORT and ECONOMY

—the BUDA "Buddy" Model F-1 One to Two Man INSPECTION CAR

—the BUDA "Roadmaster" Model F-2 Two to Four Man INSPECTION CAR

THESE two new Buda Motor Cars are built to give railroad men a **SAFER, better ride at greater economy!** Here are their outstanding features:

- **SAFE**—Get off track in 10 seconds.
- **COMFORTABLE**—Driver and one passenger sit on spring cushioned seats. Ample leg room.
- **EASY OPERATION**—All controls within normal reach of one hand . . . 4 wheel brakes . . . patented skid rails.
- **RELIABLE**—All-steel reinforced frame . . . safety guard rails.
- **LOW MAINTENANCE**—Trouble-free clutch . . . positive chain drive.
- **HONEST WEIGHT**—Model F-1—535 lbs.; Model F-2—635 lbs.; 95 lbs. rear lift.

These and many other features make it worth your while to investigate these dependable Buda Motor Cars!

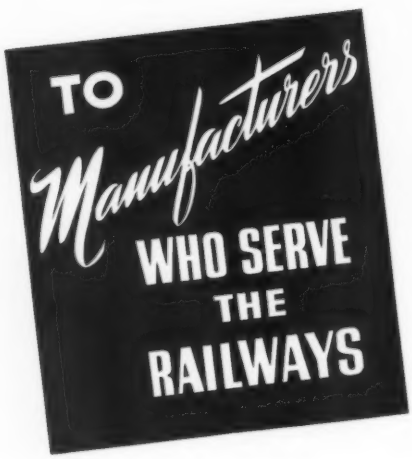
• In addition to the two Motor Cars illustrated, Buda now offers numerous other types of section, gang, hand and push cars for every requirement. In addition, Buda builds a complete line of dependable maintenance of way equipment.

Write for complete information.

BUDA ESTABLISHED 1881

Get a SAFER BETTER Ride with BUDA

THE BUDA CO.
HARVEY (Chicago Suburb) ILLINOIS



"Backing Them Up"

"Boss, I'm wondering why we don't quit selling the railroads and load up on government orders, like the X-Y-Z Company has done," said the star railway salesman to his sales manager.

"Why do you ask that, Bill?" replied the sales manager. "Are you getting tired of calling on our railroad friends?"

"That's not it, Boss. But I've been wondering if it isn't *our duty* to turn our plant over to war production instead of continuing our regular line."

"I see your point, Bill, and it's deserving of consideration. But have you thought that our present customers, the railways, are a vital arm of our military effort and that we're contributing just as directly to the war effort by providing supplies that they have to have as if we were making guns or planes?"

"How do you figure that out?"

"What good are all the guns and ammunition in the world, Bill, if they can't be delivered to our fighting forces? And how long can these factories make guns and ammunition if their raw materials stop coming in?"

"You're right, Boss, the railways enter into every step in our war program."

"It's more true in this war than ever before, Bill."

"And it's our job to help the railways keep going, isn't it?"

"That's it, Bill. They've *got* to operate and they need us more today than they ever did."

"I see it now, Boss. When we're serving the railways, we're really helping fight the war. It's *my* responsibility to show these railway men how we're able to help them keep going."

"You've got it right, Bill. And we're arranging to make *your* work more effective by enlarging our advertising program in *Railway Engineering and Maintenance*."

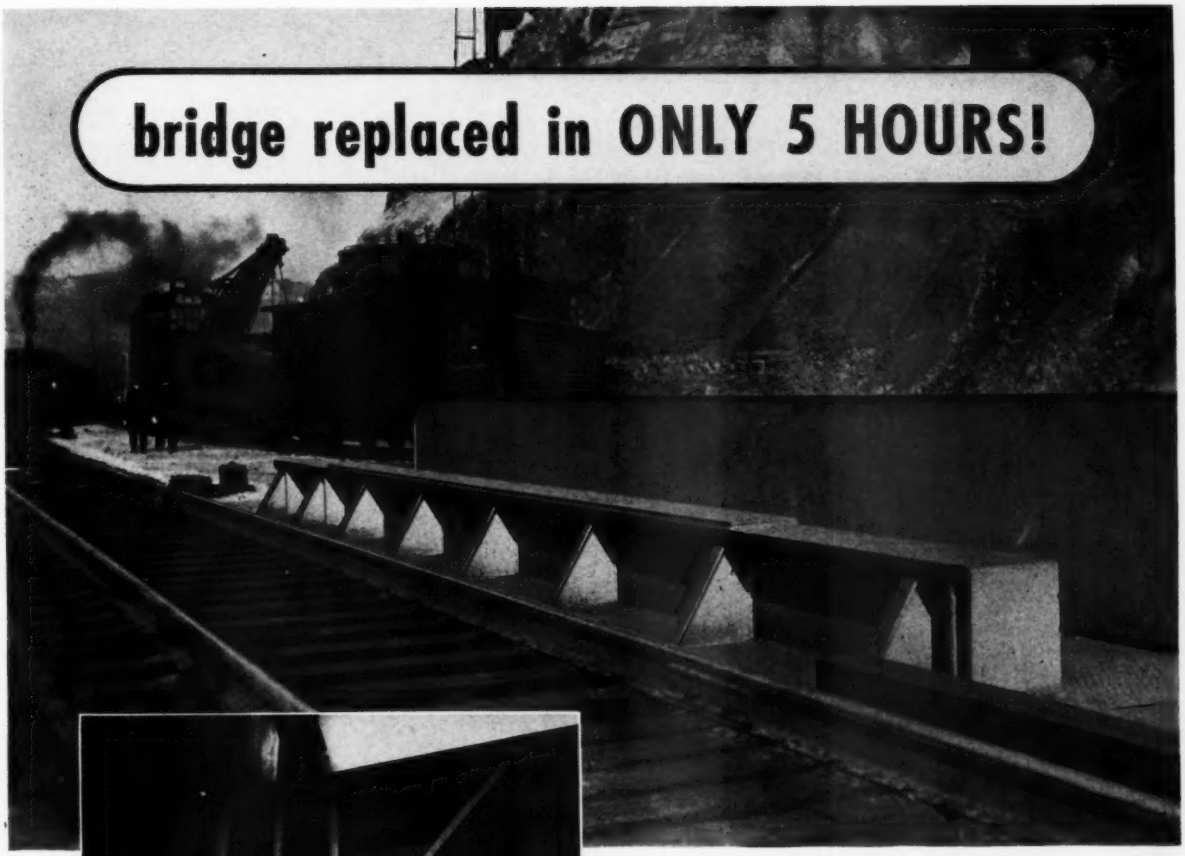
"That'll help me a great deal, for a lot of new men are coming into the picture today and we've got to tell them how our service will help them meet these demands."

"That's right, Bill—and we can't afford to let the older ones forget us either, in the rush and excitement of these days."

"Boss, I feel a lot better, for I see now where I'm standing right back of my boy in the service."

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

bridge replaced in ONLY 5 HOURS!



. . . new permanent structure was shop fabricated by welding . . .

In order to install a new bridge in the shortest possible time, this railroad turned to *welded construction.*

While field operations necessary to release the old bridge and to support the new bridge were in progress, welding permitted the new girder span to be completely fabricated and assembled in the shop. Then the new structure was moved to the erection site, rails were cut, the old span hoisted away and the new one lowered into place. After *only* 5 hours, traffic was resumed over the new, permanent structure.

Both shop and field welding on this job was done entirely with Airco Shielded Arc Electrodes. Whatever the welding problem, Airco is equipped to supply engineering assistance, to insure proper application of both oxyacetylene and electric arc processes for most effective results. We shall gladly furnish any further information on request. Address all inquiries on your business letterhead to your nearest Air Reduction office.

Air Reduction

General Offices: **60 EAST 42nd ST., NEW YORK, N. Y.**

IN TEXAS

MAGNOLIA-AIRCO GAS PRODUCTS CO.

General Offices: HOUSTON, TEXAS

OFFICES IN ALL PRINCIPAL CITIES

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

No. 163 of a series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: How Do You Like It?

July 1, 1942

Dear Reader:

We are bringing Railway Engineering and Maintenance to you in a new dress this month—with a new type face, a changed arrangement of the editorial pages, a different shape of portrait cuts in our News department and new layouts for this letter to you and for our conversation between Bill and his Boss. In making these changes we have endeavored to improve the attractiveness and readability of the pages, in keeping with the modern trends towards the use of more white space in editorial format. Through these changes we have also endeavored to give the magazine an element of freshness.

But our changes are not confined to appearance, for in editorial content we are also stepping up our tempo. Railway Engineering and Maintenance has always been edited in the field, with intimate day-to-day contacts with you in your work. In selecting the material for publication, our constant aim has been to aid you in your varied tasks; our constant quest has been for "how" material. These objectives will be maintained; in many respects they will be intensified, especially in the primary objective now before all of us—that of winning the war.

In keeping with this objective we will give preferred consideration to practices tending to promote our war effort. In this issue, for illustration, we present descriptions of (a) the widespread use of timber connectors as a means for increasing the adaptability of timber as a substitute for "critical" steel; (b) the manner in which maintenance men are meeting the war-time necessity for black-outs on the Southern Pacific; (c) the present importance of eliminating waste in oxygen in welding practices, and of containers as well, and (d) the aggressive manner in which the A.R.E.A. has revised its specifications and practices to reduce the demands for critical materials in these war-time days.

In format and in content we are endeavoring to bring you a magazine that is keyed to your needs in these strenuous days—a magazine that will be easier to read and even more helpful to you than heretofore in facing the varied problems that are pressing so heavily on you today. We hope you like these changes. We will be happy to receive your comments, critical as well as complimentary.

Yours truly,

Elmer T. Howson

ETH:WB

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

This unretouched close-up shows a section of the bridge girder cover plate that has been flame-cleaned (right) adjacent to a section still to be done (left).

OXY-ACETYLENE FLAME-CLEANING
Helps Combat Costly Corrosion

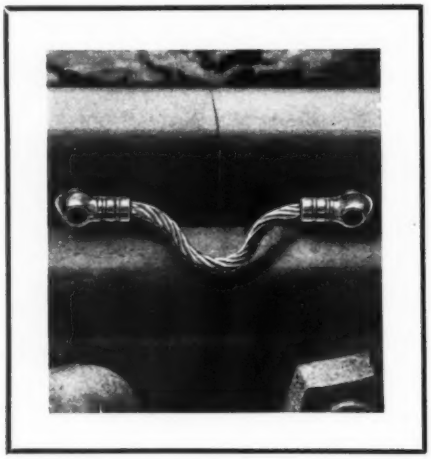
• Oxy-acetylene flame-cleaning removes loose paint, scale, and rust from steel surfaces and at the same time drives out surface moisture. After the flame-cleaned surface has been wire brushed, the protective coating of paint is applied while the metal is still warm and dry. Paint then spreads more quickly and evenly and bonds more tightly to the steel from which flame-cleaning has eliminated the major causes of subsequent corrosion and paint flaking. Oxweld representatives help the railroads determine where and how this process can be used profitably.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The word "Oxweld" is a registered trade-mark of a Unit of Union Carbide and Carbon Corporation.

RACO BONDS
IMPROVE RAILWAY SERVICE



They have reduced the number of train interruptions.

They have increased broken rail protection.

They have improved track circuit operation.

They have effected very substantial economies.

RAILROAD ACCESSORIES CORPORATION

MAIN OFFICE
137 EAST 42nd STREET, NEW YORK
(Chrysler Bldg.)
FACTORIES: LONG ISLAND CITY, N. Y., ALBANY, N. Y.

Published on the first day of each month by the

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Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

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A Challenge—Work Programs—Pipe Lines—Waste—Company Material

Cotton Belt Drains Instability Out of Its Roadbed - - - - - 466
In this article, W. S. Hanley, chief engineer, tells how his road has been literally pulled up out of the mud and stabilized by drainage

Trackmaster Develops Novel Automatic Gage - - - - - - 469
Describes ingenious attachments constructed by John L. McMillan for his motor car, which electrically, indicate the track gage continuously

Improved Timber Construction—A War-Time Alternate for Steel - 470
No. 1 of a series dealing with the conservation, substitution and reclamation of materials, designed to help the war effort of the nation

Foaming—Its Causes and Methods of Control - - - - - - 473
Abstracts of an A.R.E.A. report, which discusses the use of anti-foam compounds as a method of reducing the road blowing of engines

Enough Creosote for Tie Treatment Seems Certain - - - - - 475
John H. Forker, V.P., Koppers Company, tells Tie Association that increased domestic production should offset import restrictions

Maintenance Men Help Black Out the Southern Pacific - - - 476
This article tells of the measures being employed by the track and building forces to help keep "operations as usual" during blackouts

Must Conserve Oxygen—Maintenance Men Can Help - - - 478
Urges maintenance of way and structures men, through waste avoidance, to help prevent a serious shortage of this gas from becoming critical

A.R.E.A. Suggests How to Conserve Critical Materials - - - 480
Tells of specific emergency measures taken by the association recently in the interest of material conservation, substitution and reclamation

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Tie Plates and Buckling Track
Coating the Interior of Tanks
Oiling Joint Bars in the Track
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ELMER T. HOWSON
Editor

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Managing Editor

MERWIN H. DICK
Eastern Editor

GEORGE E. BOYD
Associate Editor

JOHN S. VREELAND
Associate Editor

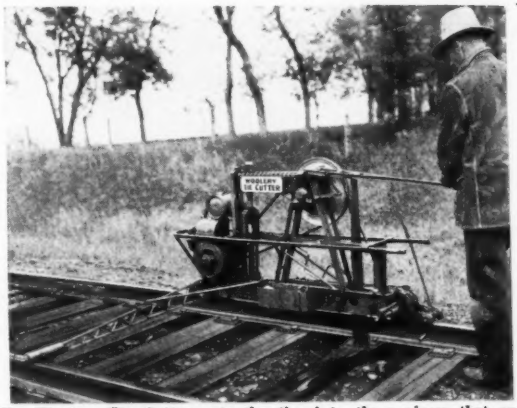
FREDERICK C. KOCH
Business Manager

They Work In Rock Ballast Too!

Woolery Tie Cutters Save Money, Time and Essential Labor in Tie Renewals in all Types of Ballast

Woolery Tie Cutters, in actual service on main line tracks, are proving daily their ability to replace ties in rock, as well as gravel and other ballasts, quickly, easily and with similar substantial savings in cost, essential labor and time.

By utilizing the Woolery Tie Cutter, railroads can now secure results which are especially vital in these war days. They can not only complete their tie renewal programs weeks, even months, ahead of their normal schedule, but they can also divert labor from tie-renewal work to other important tasks and, incidentally, pay for Woolery Tie Cutters with the savings they effect.



The Woolery Tie Cutter cuts the ties into three pieces that are easily lifted (not dug) out.

Woolery Weed Burners Now Used by Over 60 Railroads

Woolery Weed Burners provide the most economical way to get rid of weeds.

There's a Woolery Weed Burner for every job; the Giant Octopus 5- and 3-burner models for main line work, the Midget Octopus 2-burner type for branch lines and around terminals, and the Junior Portable unit for off-track work around buildings.

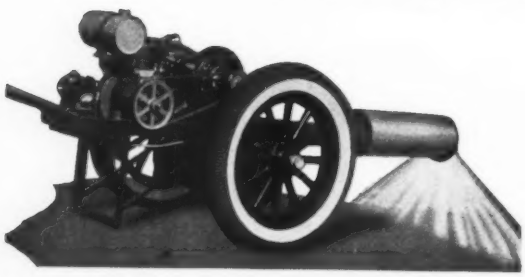
Write us Today for Complete Information on Woolery Track Maintenance Equipment.

With the Woolery Tie Cutter, trenching is eliminated, there is minimum disturbance to ballast and surfacing is reduced 50%.

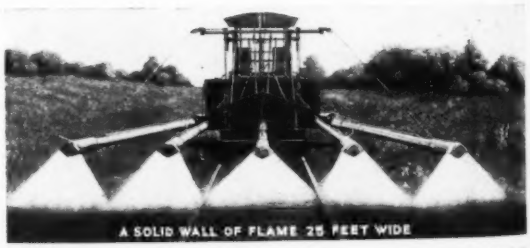
Woolery Machine Co.

Minneapolis, Minnesota

TSA Railway Exhibit Roadmasters Association EXHIBITOR HOTEL STEVENS CHICAGO SEPT. 14-17 1942



Junior Portable Weed Burner for use on or off tracks



Giant Octopus Model with 5 burners. 3-burner and 2-burner Models are also available.

"To Keep 'Em Flying, We Must Keep 'Em Rolling"

The Challenge and Opportunity of the Present Crisis to All Who Can Help Increase Railroad Efficiency

Railroad men are now virtually part of the nation's armed forces.

War expenditures this year are taking about one-fourth of national production and income. But government freight and passengers move much longer distances than commercial traffic. Hence, the one-fourth of the nation's production and income being devoted this year to war may be requiring one-half of the railway service being rendered. And the proportion of railway service devoted to war will increase indefinitely.

Thus one-half of the railroad plant—yards, tracks, cars, locomotives, signals—is already as much a part of Uncle Sam's war machine as are guns, tanks, bombers. One-half of each railroad man's time is devoted to the Army, the Navy and the Air Force as truly as if he wore a uniform.

This is a railroad war—depending far more upon efficient railroad service than any previous war in history.

United States Senator Schwartz of Wyoming coined a fine railroad slogan in a recent letter when he said: "To 'Keep 'em Flying', we must 'Keep 'em Rolling'." Airplanes, trucks, ships are more involved in actual combat than railroads—and so it is pictures of them, rather than of trains, which receive most attention in the illustrated newspapers and magazines. But planes, trucks, ships (as one of our railroads recently emphasized in an advertisement) have to start their trips by train—in the form of coal and iron from the mines, then through every step in fabrication, and as finished products to tidewater.

Mechanized warfare requires maximum production by heavy industry; and heavy industry can be served adequately only by railroads. Germany, as newspaper correspondents just returned are disclosing, has learned belatedly that spectacular superhighways make good pictures, but that if a nation is to function effectively in modern war it must have efficient railways. And the Nazis are trying feverishly to restore the depleted equipment and efficiency of the German Reichbahn, which they neglected while building up air lines and autobahnen.

Railroad performance is largely determined by the ingenuity and effort of railroad men.

As vital and integral a part of the war effort as they are, our railroads are not the object of official government attention to the same extent as other parts of it. This is because, as yet, no scarcity of railroad transportation has been felt; while planes, ships, tanks, guns, soldiers are needed immediately in much greater quantity in the world-wide zones of action where the enemy is. The fact that railroad shortages have not developed has deprived the carriers of the "fostering guardianship" of government procurement officials. The railroads may take pride in the lack of shortcomings thus far in their performance.

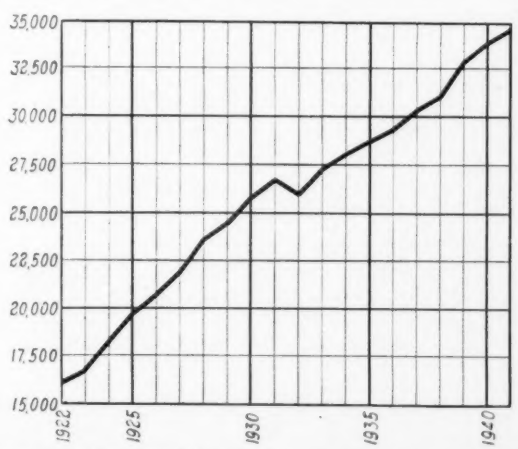
The railways do, of course, have the welcome and understanding co-operation of the transportation branches of the armed forces. They are aided in innumerable ways by Director Eastman of the Office of Defense Transportation and his associates, and by the shippers—best-informed and most collaborative customers any industry ever had. Other branches of the government accord as much consideration to railway requirements as they believe necessary preoccupation with more critical situations will allow. But great surges of popular fervor, which animate the construction of planes and tanks, and help to conserve rubber, gasoline and other scarce metals, are not aroused to increase railroad efficiency and performance. The great task of the railroads has to be done principally with steam generated within the industry itself. It is the high duty and opportunity of railroad men, from track walkers to chief executives, to generate that necessary steam and use its energy with the utmost skill in providing transportation for victory. Early Victory!

A depleted plant and working force—but unprecedented railroad service.

In March (the latest month for which figures are available at this writing) the railroads already were handling 34 per cent more ton-miles of freight and 25 per cent more passenger-miles than in the same month of the boom year 1929. And they did the job with 24 per cent fewer employees, 24 per cent fewer freight cars, and approximately one-third fewer locomotives and passenger cars.

An astounding record—but no miracle. A record built with foundations in the past. The present generation of railroad men started with the degree of efficiency already attained by their predecessors. Every day, every week, railroad men and manufacturers of materials had hit upon means of doing railroad jobs a little better or with less lost motion. News of these improvements had been spread about by word of mouth, or through the medium of the industry's press; and the improvements begun by individuals had steadily augmented the efficiency of the entire industry.

That is the formula. Nothing so marvelous about it—except the results over periods of time. It works in peace as well as war. Take one well-known yardstick—gross ton-miles per freight train hour:



Curve Showing Remarkable Increase In Gross Ton Miles Per Freight Train Hour From 1922 to 1941 Inclusive.

See how it has trended constantly upward, even in years of untoward conditions, with only brief and inconsequential set-backs.

The railroads are not a new industry. Therefore efficiency on them is not increased startlingly by one or a few brilliant ideas or inventions. It is caused by thousands of relatively slight improvements introduced steadily by thousands of thoughtful men, in the service both of the railways and of railway manufacturers.

Applying the Efficiency-Improvement Formula to the Present Job.

This is the time-tested formula for securing increased railway efficiency. The need for increased efficiency will be more critical in the months just ahead than in all past railroad history. Will the old formula deliver the necessary results?

It will—upon one condition. This is, that working of the old formula be accelerated. The formula has two parts. One is the discovery of new and better ways of doing transportation work. The other is getting word around about these new and better ways. There is required—

1—Utmost encouragement to active minds in the industry to evolve more efficient methods faster.

2—Surer and speedier means than ever before of spreading the word about these more efficient methods throughout the industry, so that they may be quickly adopted by all.

One of the usual important factors of improved performance (plenty of materials, and ample manufacturing capacity for more efficient devices) is temporarily absent. Ingenuity, and publicity of results must consequently concentrate largely now on methods—ingenuity and publicity by both railroad men and manufacturers in getting old things done in new ways, many new things done, and publicizing them so that every phase of railroad maintenance and operation will be benefited and accelerated.

How Encourage Initiative and Ingenuity?

Many railroads have "suggestion plans," the operation of which can be intensified. Whether with or without formal plans of this kind, management can indicate to supervisors and employees that new ideas and methods are needed and welcome, and stimulate emulation in developing them.

Giving widespread and prompt publicity to improved methods—in the shop, the yard, the freighthouse, on the track—is the stone that kills two birds. For it not only gets the word around to others, so that they may adopt your improved methods more quickly than otherwise, but stimulates them to develop methods by which you may benefit. There can be no surer way of getting those with ingenious and inventive minds to acting on their ideas than that of getting the whole industry to talking of increased efficiency to help win the war.

"Efficiency for Victory."

Railway Engineering and Maintenance and its associated publications (Railway Age, Railway Mechanical Engineer, Railway Electrical Engineer and Railway Signaling) have long been a principal means of informing the whole railroad industry of contributions toward efficiency and economy, wherever and however made. Now, for the duration, the efforts of these publications will be concentrated on collecting and disseminating, in both their editorial and advertising pages, news of facilities and methods, wherever adopted, for producing more ton-miles and passenger miles with the limited equipment, materials and labor force that will be available.

Our transportation editor will report currently from the "firing line" the innumerable things being done to increase the utilization and productivity of present plans . . . Our mechanical editors will recount the latest and best expedients adopted to put and keep the available supplies of locomotives and cars in the best practicable condition for the most efficient utilization . . . Our engineering and signaling editors will record the means being used to put and keep all permanent structures in condition to permit the most efficient utilization of equipment . . . Similar innovations and improvements in methods will be reported from all other railroad departments, including, of course, performance of the vital purchases and stores function, with accent on reclamation, conservation, substitution . . . Manufacturers of equipment and supplies will, in our advertising pages, contribute, as never before, information directed to helping the railroads to increase the service and prolong the life of the limited facilities that will be available, and to finding substitutes for materials heretofore used which "for the duration" have become largely or wholly unavailable.

In order that our railway papers may perform their part of the great task ahead as thoroughly and promptly as possible, we shall need the help of our readers. When something is done on your railroad that other railroads could do for the benefit of all, let us know about it. Our editorial staff is working intently to discover and report all important new developments as repidly as possible—but obviously, the active collaboration of our thousands of railroad readers will enable us to do a more prompt and more effective job.

After the War.

What traffic conditions peace may bring to the railroads nobody knows—but it can be predicted with assurance that, the more efficiency they attain during the war, the stronger they will be for meeting conditions after the war, whatever these may be. This should afford additional incentive, if needed, for attainment of the utmost efficiency during the war of which the railroad industry is capable. Every effort put forth to help win the war will be an effort to help solve the problems that will confront the industry after the war.

Such a time of stress has its compensations. It demands full development and utilization of ability—and in such a time ingenious, energetic, devoted men disclose their latent resources to themselves and their superiors. It is every railroad man's present duty to contribute his utmost to "efficiency for victory"; and also his opportunity to so demonstrate his capabilities, when they cannot fail to be recognized and appreciated, as to assure that they will be rewarded by advancement. Duty and opportunity thus go hand in hand.

It is the hope of the railway publications of the Simmons-Boardman Publishing Corporation that they may efficiently serve all those pursuing the joint objectives of "Efficiency" and "Victory," the full and speedy attainment of which is so essential to our railroads and our country. And in furtherance of this objective we shall welcome all the information, ideas and suggestions from men in the railway field and the railway equipment and supply manufacturing field, the dissemination of which by these publications may be constructive "for the duration" and afterward.

Railway Engineering and Maintenance

Railway Age — **Railway Mechanical Engineer**

Railway Signaling — **Railway Electrical Engineer**

This statement is appearing in all five of the Simmons-Boardman publications in the railway field, reaching more than 75,000 railway officers and employees.

Railway Engineering and Maintenance

A Challenge

To Maximum Effort

Railway employees now face the greatest challenge in their history. Our nation is engaged in the most gigantic war ever recorded. Its need for men and materials exceeds all previous experience. And in every step in this program, transportation—rail transportation—plays a vital part. In many respects this is a railroad war, for all-out production in industry is of little benefit if the planes, the tanks and the munitions coming from those plants cannot be transported promptly to the points where they are required—and they cannot be so transported without the railroads.

A Ringing Answer to the Challenge

The railways are presenting a ringing answer to the challenge. In March, the latest month for which the figures are available, they produced 34 per cent more ton miles of freight and 25 per cent more passenger miles than in the same months of the all-time record year of 1929. And individual roads are making even more outstanding records. Especially spectacular is the performance of the Southern Pacific, which is currently producing 85 per cent more ton miles than in 1929.

And in this achievement of the railways, maintenance of way forces have a large part. On them rests the responsibility for making good the greatly increased wear and tear of this record traffic and of strengthening their tracks and structures where necessary, in order that there may be no slowing down of this traffic because of weakened facilities. The most up-to-date measure of their performance is reflected by the expenditures which they are making for upkeep. For March, these expenditures were 37 per cent *larger* than for the same month of 1941 and 57 per cent *larger* than in March, 1940. They were larger than for this month in any year since 1929.

This is a record for activity that warrants commendation, especially when it is considered that it is made in the face of acute shortages of numerous critical materials. It demonstrates that maintenance forces are keeping pace with their colleagues in the transportation department in meeting the challenge confronting them.

It is records such as this that caused United States Senator Clyde Reed of Kansas, a recognized authority on railway problems, to declare on the floor of the Senate recently that "the railroads today are doing the most phenomenal job in their history. This record of the greatest transportation agency in the world should fill with pride the men who are making it. They deserve the gratitude of the people of the United States."

No Time for Neglect of Details

Yet, splendid as this record is, maintenance employees cannot afford to allow a single precaution to be neglected. They can take nothing for granted. In this respect they must heed the warning in the familiar quotation:

"For the want of a nail, a shoe was lost;
For the want of a shoe, the horse was lost;
For the want of a horse, the rider was lost;
For the want of a rider, the battle was lost;
For the want of a battle, a nation was lost—
And all for the want of a horseshoe nail!"

From chief engineer to section laborer, it is incumbent on maintenance forces today to devote that same consecration to the task that charac-

terized the men who fought on Corregidor Island and who are now carrying the battle to the enemy in the farthest parts of the world. Railway men are "in the service today" as never before and they have accepted the challenge which it presents. They must make good; they will make good.

Work Programs—

Disrupted by War-Time Conditions

MOST railroads are finding this year that it is next to impossible to conduct their maintenance programs in accordance with their usual orderly procedure. This is true because of a combination of factors. In the first place, deliveries of many materials are highly uncertain, and for this reason it is not possible to program certain types of maintenance work more than a few weeks in advance with any assurance that the necessary materials will be available when needed.

The situation regarding rail deliveries, which is particularly perplexing, provides an example of what maintenance departments are facing today. During normal times, the railroads can lay out their entire season's rail-laying programs early in the year, setting up definite schedules for the gangs and the assignment of equipment with complete confidence that the necessary quantities of rail and fastenings will be forthcoming in an orderly manner to meet the needs of the program. In fact, the ability to program work, and thereby promote the efficient use of men and equipment, has been an important factor in reducing maintenance costs in recent years. Today, with rail being delivered in relatively small lots, and with these deliveries highly uncertain from month to month, the programming of rail-laying work in the customary manner is largely out of the question.

Shortages of manpower are also becoming a problem. That railroad is fortunate that has not yet felt the pinch of this shortage, especially in districts where the demands of war plants have been superimposed on the call to military service. Even though special measures have been taken to secure an adequate supply of labor, such as the establishment of labor camps, some railroads have faced the necessity of starting specific maintenance jobs before the number of men necessary to an efficient organization had been obtained, or of postponing the work until the necessary men were secured.

Because of the disruptive influences of these various factors, maintenance officers are now finding it necessary to do a great deal of improvising. Thus, they must improvise ways of keeping men busy while awaiting the receipt of needed materials, or they must improvise methods of conducting work with a smaller number of men than would ordinarily be considered efficient. Obviously this means that the most efficient methods must now frequently be sacrificed in the interests of getting the work done. The extent to which efficiency is made to suffer will be inversely proportional to the degree of ingenuity that is applied to the solution of the problem.

Frequently, and often necessarily, decisions regarding the measures to be taken to cope with specific situations are being made locally. It is pertinent to inquire, however, whether better results could not be obtained by a broader approach to the problem, say on a system-wide basis, with a view to the development of such changes in maintenance practices as may be found desirable or practicable to the end that the men and machines available today will be used with maximum efficiency.

At least one railroad has done this and, as a consequence, has practically revolutionized its track maintenance procedure, with the result that it is obtaining a substantially larger output per man than heretofore. As a matter of fact, recalling the experiences of the depression years, it may be that practices developed under the stress of these times may be so productive of efficiency and economy as to warrant their continued use after the present emergency ends. This, of course, is secondary; the immediate and vital objective is to institute such measures as will make it possible to maintain the fixed properties of the railroads at the high standard of efficiency and safety that is necessary today, and to do this with maximum economy in the face of growing shortages and uncertainties of men, materials, tools and work equipment.

Pipe Lines—

Abandoned Systems May Be Asset

WHEN a wayside water station is established, the underground system of piping is usually quite simple, consisting generally of a suction and a discharge line which may be expected to remain in service with little or no change for many years. On the other hand, the underground systems at shops and terminals may be extensive and complicated when installed, and may be subject to extension and alteration from time to time as facilities are increased, revised or discontinued. During these changes, some of the main and service lines are frequently abandoned, while the abandonment of certain facilities may result in the abandonment of still other sections of the underground system.

In the course of time, at almost any busy terminal or large shop, the aggregate of abandoned underground pipe represents a considerable investment, while the total salvage value is surprisingly large. As a matter of fact, however, in many cases in the past, no attempt has been made to take up these abandoned lines because the salvage value of the used pipe has been less than the cost of recovery.

Today a different situation confronts the railways. Pipe materials are difficult to secure and, when obtainable, the quantities are restricted. Situations may arise, in fact not a few have already arisen, where the cost of recovery is negligible, compared with the need for the pipe. For this reason, abandoned underground pipe lines, particularly of cast iron, may be specially valuable as a source of much-needed material. Old service lines of steel pipe are likely to be less dependable from a salvage standpoint because of corrosion. There is scarcely a

terminal or shop of importance that does not have a considerable system of abandoned underground pipe lines. Some roads have already found them to be a valuable asset. Others may find it to their advantage to study their potentialities.

Waste—

War Effort Demands Its Elimination

WASTE of materials has never been condoned by railway engineering and maintenance officers, but it cannot be denied that it has occurred in operations under their direction in the past, unwittingly at least. Some of this waste has been the result of carelessness, ignorance, incompetence and sheer laziness on the part of workmen. This is inexcusable. In addition, a sizable amount of the remaining service life of many materials has frequently been sacrificed in the interest of reduced labor requirements and lower overall replacement costs.

While the latter class of loss may have been defensible in the past, and, where critical materials are not involved, may still be defended, especially in view of the shortage of labor that is developing, the deliberate or careless waste of materials should not be overlooked or condoned at any time, and especially during the present emergency. While this applies to every class of material used by the engineering and maintenance forces, it is critically essential concerning many of them at the present time, not only in the selfish interest of the railroads themselves, but, of still greater importance, to the war effort of the nation.

Two of the materials in this latter group are oxygen and acetylene welding and cutting gases, especially oxygen. The supply of gas cylinders is also experiencing a shortage. That this situation has developed is not surprising in the light of the country's huge expansion in war industries, with the large demands being made by these industries for cutting and welding gases. To meet these largely increased demands, the oxygen-producing manufacturers have widely expanded their plants and gas-producing equipment, and continue with this expansion program to the end that there shall be no shortage of this indispensable "tool" in either war production or industry generally.

Just as a car shortage would handicap the railways in the handling of the raw and finished materials of the country's war production, so a shortage of gas cylinders and gases would be a handicap not alone to war production, but also to many industries dependent upon them for routine construction and maintenance operations. The maintenance forces of the railways, who in recent years have expanded their use of cutting and welding gases widely in track, bridge, building and water service work, would be seriously affected by a shortage of these gases, both because of their labor-saving value and because of their large value in material conservation through reclamation and repairs. For both of these reasons, maintenance men have an important obligation to avoid even the smallest waste of these gases and to co-operate with the gas-producing industry of the country equally as effectively as the railroads expect their customers, the shippers, to co-operate in these days in conserving rail transportation by loading cars to maximum capacity and by unloading and releasing them with the greatest dispatch.

Being appraised of this situation, and the manner in which they can co-operate most effectively, it is a certainty that railway maintenance men will co-operate. To the end that they may both know of the situation and of effective measures of co-operation, an article entitled "Must Conserve Oxygen" is presented in this issue. This article contains a number of valuable suggestions on how to conserve cutting and welding gases through the avoidance of wasteful practices. If maintenance men will heed these suggestions, they will be performing a very real service to their industry and to their country.

Company Material—

Conserve Revenue Cars as Never Before

EVEN in normal times the railways are confronted with a problem in moving company material over their lines and of unloading them after arrival. It is necessary that these materials be provided to insure continuing maintenance and, in recognition of this necessity, some roads provide special non-revenue cars for handling shipments, notably ties, that both originate and are delivered on their own lines. Shipments that originate beyond the lines of the receiving road obviously must move in revenue cars. However, even when special cars are assigned, the use of revenue equipment cannot always be avoided.

Cars containing materials consigned to shops or storehouses can be set out at convenient unloading points, usually at a platform, where they can be unloaded quickly, without interference. In strong contrast, maintenance-of-way operations are far-flung and are carried out by widely-scattered forces. Furthermore, much of the material required for maintenance must be distributed between stations, by forces whose headquarters may not be at the station to which the car is billed. Yet, normally, it is important to release cars promptly, for no income can be derived from an idle car. At present, when the roads are handling a record tonnage, much of it of a critical character, the quick release of cars becomes of urgent importance from a national as well as a revenue stndpoint, particularly since cars are not too plentiful at best.

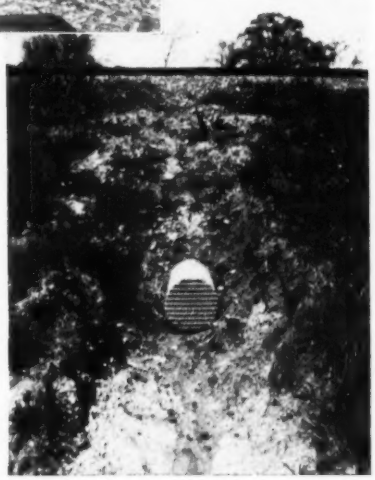
Division officers, especially supervisors, have always borne the responsibility for securing the prompt release of cars containing company materials. Today this responsibility has increased in the same ratio as the need for keeping cars in constantly active service. This is also true of non-revenue cars assigned to company material service.

It becomes of real importance, therefore, that the supervisors be given the car numbers and routing of all carload shipments as soon as they are billed. With this information, he should make certain that the car is not sidetracked or delayed in its passage through terminals. He should also make arrangements in advance for unloading promptly after it arrives, and for immediate notification of its arrival at destintaion, so he can check its release.

Cotton Belt

Left—A Stretch of Typical Main Line Track on the Cotton Belt

In this article, the author tells how his road, seriously rundown at the end of federal control, was literally pulled up out of the mud and dried out through an extensive program of ditching, right-of-way sloping, pole driving, and subdraining, resulting in a marked reduction in track maintenance costs. In 1941 alone, as compared with 1923, it is estimated there was a saving of 1,420,953 man-hours of maintenance labor on the road. The net saving in maintenance labor costs, 1941 over 1923, was actually about $519,200.



The Guarded Outlet of One of the Many Perforated Pipe Subdrains Installed

W. S. Hanley

NO phase of track maintenance deserves more attention than good drainage. Efforts to achieve this pay large dividends, both psychic and monetary. Water has a most destructive influence on the track foundation and the quicker and further it is carried away from the roadbed the better for all concerned. Our task is to make the roadbed immune to the destructive effects of water to the greatest extent possible, and at the lowest possible cost.

We do many things to accomplish this. For example, let me review the improvements that have been made on the St. Louis Southwestern (the Cotton Belt) to stabilize the roadbed and track through drainage of one type or another, pole driving, etc.

At the end of Federal control, this railroad was returned to its owners in poor physical condition. Embankments were narrow, drainage had been neglected, and the roadbed was weak. The track, for the most part, was ballasted with a clay gravel which required a "mud dress." With such track conditions it was absolutely impossible to provide good transportation service or to operate trains efficiently or economically.

Much Work Done

To remedy this situation, a Jordan ditcher was purchased and all cuts were cleaned out to standard width and depth. In wet cuts, where the material was soft and heaving, tile drains were installed. To drain water pockets in fills, perforated galvanized iron pipe was placed. In addition, all embankments were widened to full standard width, and ditches, which were formerly at the toe of embankment slopes, were moved out to within four feet of the right-of-way fence. Furthermore, the surface of the right-of-way was sloped evenly away from the toes of embankments to the ditches, facilitating the use of mowing machines for cutting vegetation.

The Cotton Belt had always been handicapped by the lack of an adequate supply of good ballast material. In 1923, a ballast plant was opened on the Ouachita river near Camden, Ark., at which point the railroad now has a practically inexhaustible supply of good gravel. From 1923 to date, we have secured 2,954,272 cu. yd. of gravel from this plant. This has enabled us to provide a track that is remarkable for its resilience and smooth riding surface.

Drains Instability

Out of Its Roadbed

By W. S. HANLEY, Chief Engineer,
St. Louis Southwestern, Tyler, Texas

On January 1, 1920, there were, in the aggregate, 52.86 miles of wood trestle on the Cotton Belt. Since that time, 10.02 miles of these trestles have been eliminated, in whole or in part, where drainage surveys indicated they were no longer required, and by replacement with other structures of more permanent design. In general, all trestles serving small drainage areas, where local conditions permitted, have been replaced with concrete pipe or corrugated cast iron pipe culverts. At other trestles requiring larger waterways, or where restricted headroom or other local conditions would not permit the use of pipe culverts, we have used reinforced concrete boxes and short steel spans on concrete abutments.

Extensive Sub-Drainage

The section of the country served by the Cotton Belt is blessed with abundant rainfall. The average annual precipitation in Missouri, Arkansas, Louisiana and Texas is 37.4 in., 48.4 in., 57.5 in., and 44.8 in., respectively. This has made it imperative that everything possible be done to eliminate chronic bad drainage conditions. Recognizing this, an aggregate of 92 miles of tile drains, in mains and laterals, were installed to drain wet cuts. This work cost an average of $1.14 per linear foot of track stabilized.

To drain water pockets in fills, 1,745 rock drains were installed. These drains generally provided only temporary relief. One day I received a suggestion from one of our division engineers that we try tile drains in our fills. About the time we had reached an impassé in our discussion, a salesman from one of the corrugated iron pipe companies dropped into my office and showed us a drainage installation in a railroad yard, employing perforated galvanized iron pipe. This monolithic perforated pipe appealed to us immediately and we have used it ever since to drain water pockets in fills, always with satisfactory results. Since that date, 1927, we have stabilized a total of 10.5 miles of track by this method, at a cost of $0.957 per linear foot.

Perforated Pipe

In a number of instances we have cured slides in high embankments by the use of perforated pipe. One case worthy of special note was in the west approach to the Harahan bridge at Memphis, Tenn. This bridge is owned by the Arkansas & Memphis Railway Bridge and Terminal Company, which, in turn, is owned jointly by the Missouri Pacific, the Rock Island and the Cotton Belt. In 1930 there were serious slides in the west approach embankment to this bridge, which is approximately 50 ft. high and carries two main tracks. Estimates were prepared for the construction of a banquette at the base of the fill, but the large expenditure involved for this method of correction prompted a thorough investigation on the ground by the chief engineers of the owning roads. This investigation disclosed water pockets in the fill to a

Raised Out of the Mud, Drained and Ballasted, This Track Is a Far Cry From What It Was at the End of Federal Control

Widened Shoulders, a Full Ballast Section and a Clean, Well-Graded Right of Way, Made This a High-Speed Stretch of Track, with a Large Saving in Maintenance Labor

depth of 16 ft., and led to a decision to install perforated pipe in the fill to stabilize it. This work was done with satisfactory results. Only a short time ago I wrote to the resident engineer in charge of this line to inquire if this installation was still giving satisfactory results. In reply, he said: "We figure that the results obtained from these installations are highly satisfactory. All pipes were placed in locations where we were having slides, and these slides have given us no further trouble." The cost of stabilizing this fill was $3,116.71.

Drives Poles

There have been some instances where tile drains have ceased to function properly after a number of years of service. In these cases we have resorted to driving poles to stabilize the track. This method has been used successfully on certain other railroads for a number of years, and although it may seem unorthodox to many of us, I am able to testify that it produces results. We have used these poles to stabilize tracks in cuts and in fills up to a height of four feet. The poles have a minimum diameter of 7 in. and vary in length from 8 ft. to 12 ft. They are driven as closely as possible to the ends of each tie, with their tops at a level six inches below the bottom of the tie. To date, we have stabilized a total of 53.12 miles of track by this method, at an average cost of $0.69 per lin. ft. At the present time, we are testing installations of longer poles in higher fills.

Improved 141-Mile Line

One of the most important of our improvements was the line and grade revision project undertaken between Mt. Pleasant, Tex. and Corsicana, a distance of 141.2 miles, to provide a satisfactory route for our highly competitive transcontinental traffic which has to be moved on fast and dependable schedules. This railroad was built originally in 1877 to 1881, with a gage of three feet. In 1887, the gage was changed to standard. Up to 1928, when our general improvement project was started, the grade and line were as originally constructed, with the exception of a few minor improvements.

This district reflected the character of railroad location and construction of 65 years ago. The engineers who located the line were intelligent, resourceful men, and, considering the conditions under which they labored, with poor equipment and a lack of adequate capital, they produced the best results that could be expected. Except for a few stretches of cinder or sand ballast, or a combination of both, the line was unballasted. Drainage was poor or non-existent. The grade line followed closely the natural surface of the ground, with maximum grades of 2 per cent and curves up to 10 deg. The track in this territory was subject to overflow at 20 different points.

The grade between Mt. Pleasant and Corsicana is now a virtual one per cent grade in both directions, with maximum curvature of about 4 deg. The line was well ballasted with a good grade of gravel from our plant on the Ouachita river, and every one of the 20 overflow places has been made immune to high water. The rehabilitation of this district has paid a very satisfactory return on the investment or cost of improvements.

Large Savings

On our heavy-traffic lines, we have eliminated the slot-spiking of joint bars and depend on anti-creepers to anchor the rail. It is important that the rail be well anchored. Otherwise, the ties will become unseated, permitting rain water to reach the bottom of the ties quickly, and thus cause the ballast to churn. We have made extensive use of discing machines to destroy vegetation in the ballast shoulder and to loosen the ballast to permit better drainage.

It seemed certain that the program of track stabilization through drainage carried out on the Cotton Belt would result in a saving in track labor and in increased operating efficiency. That it has is evident in a comparison of the record of 1923, about which time we started the track improvement program, and that of 1941. In 1941 we handled approximately two billion eight hundred million more gross ton miles of freight than in 1923. Notwithstanding this increased tonnage, there was a saving in track labor for ordinary maintenance in that year over 1923 of 1,420,953 man-hours, a decrease of 42.1 per cent, which at the prevailing wage scale amounted to $575,486; however, there was an increase of $56,262 in repairs to roadway machines and in pay to roadway machine operators in 1941 compared with 1923, making the net saving $519,224. That the entire railroad has been operated more efficiently throughout this period is seen in the table of operating items for 1923 and 1941, shown above.

Statistics Comparing Operating Efficiency on the Cotton Belt, 1923 and 1941

	1941	1923	Per cent Increase or Decrease
Gross tons per freight train mile	1,826.0	1,353	+34.96
Freight train miles per train hour	20.0	11.1	+80.18
Pounds fuel consumed per 1,000 g.t.m.	83.0	137	—39.42
Average miles per car per day	86.4	29.40	+193.88

Trackmaster Develops Novel Automatic Gage

JOHN L. McMILLAN, trackmaster on the Alton at Bloomington, Ill., has constructed an automatic electric gage, which he has attached to his motor car and which continuously indicates the exact gage of the track in fractions of ⅛ in. between the limits of ¾ in. wide gage and ½ in. tight gage. The indications of gage are shown by lights on a panel mounted on the front of his car and the panel is equipped also with a bell, which may be connected to ring automatically when the motor car operator is unable to watch the lights or does not desire to make an exact check of the gage. In addition, a pressure tank and hose attachment, filled with marking fluid, may be connected to the gage so that a spray will mark the rail at any variation of gage selected.

The gage itself consists of two specially-constructed wheels mounted on an axle that is attached to the motor car by two steel straps which are free to move laterally on two short steel shafts at the rear of the car, a switch box mounted on the axle of the gage, a panel mounted on the front of the motor car with lights and bell connections, and batteries. The left wheel of the gage is loose or free to move laterally on its axle, while the right wheel has no lateral freedom. A spring of moderate tension, coiled around the axle inside the left wheel, tends to push this wheel outward and forces the flanges of both wheels of the gage to fit against the rails. In the progress of the gage on the track, the movement of the left wheel in relation to the axle as the gage varies is transmitted to a switch lever in the switch box by a small rod which causes the switch lever to move in an arc, contacting the various points in the switch box. The gage is adjusted so that each of the eleven contact points in the switch box corresponds to a ⅛ in. variation in gage between ½ in. tight gage and ¾ in. wide gage.

Light Panel

The panel mounted on the front of the motor car has eleven small lights, a battery switch and a bell switch for the bell indication. The eleven lights are connected to the contact points in the switch box in the same order from left to right. Four of the lights at the left of the panel have green lenses and indicate ½ in., ⅜ in., ¼ in. and ⅛ in. tight gage from left to right respectively. The next light has an amber lens and corresponds to exact gage. The six lights at the right are red in color and represent in the same order wide gage in variations of ⅛ in. up to ¾ in.

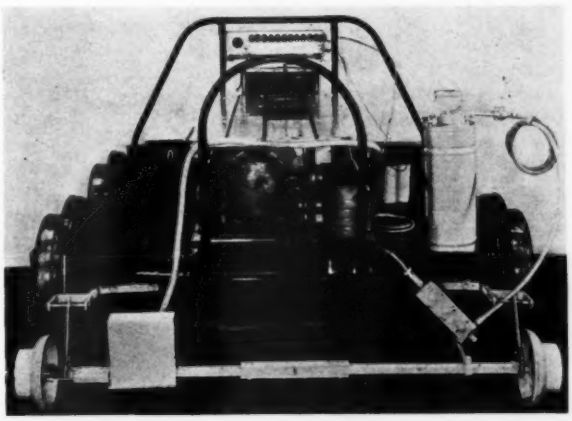
The bell switch, mounted at the left of the panel, has eleven contacts, which are connected to the corresponding contact points in the switch box. When the bell switch is set for any one of the variations in gage selected, the bell rings when the gage of the track corresponds to that gage. This is accomplished by an electro-magnetic contact, known as a relay, which in turn is connected through the bell switch to the switch box. When the track gage corresponds to that for which the bell switch is set the light indication goes on, the electro-magnet of the relay is energized, closing the bell contact, and the bell rings until a push button is pressed, resetting the relay contact in open position. In this manner it is possible to set the bell switch for the gage which it is desired to check and depend upon the bell, making it unnecessary to watch the indicator lights if a fine check of gage is not to be made or if other conditions at the time require the attention of the motor car operator.

Rail Marker

The rail marker consists of a two-gallon pressure spray tank, a hose, an electrically-controlled needle valve and a mist nozzle, which is directed toward the side of the rail. The tank is mounted on the back end of the motor car and is similar to those used for spraying fruit trees, etc. It is pumped by hand to a pressure of approximately 35 lbs. and then locked. The flow of the marking fluid is controlled by the needle valve. The valve is operated by a solenoid coil and spring arrangement. The coil may be connected to the bell switch so that it is electrically charged and the valve opens whenever the gage of the track corresponds to that for which the bell switch is set. The spring closes the needle valve when the current is released. A solution of methylene blue dye, soluble in water, may be used as a marking fluid, using a mixture of about one ounce to a gallon of liquid.

One of the outstanding features of the gage is the design of the wheels and the limitation of the spring action which insures the return of the wheels to the track without derailing the device when passing over frogs and crossings. This is accomplished by limiting the extent of the spring action so that the wheels, when raised by an obstruction of any kind, cannot roll off the top of the rails. The wide, bell-shaped, curved flanges of the wheels, plus the weight of the gage, quickly overcome the moderate force of the spring and the wheels drop back to their normal position on the rails. This arrangement is possible because it has been found, due to their rolling action, that very little spring tension is needed to keep the wheels against the gage side of the rails.

It is said that the gage will function satisfactorily on main lines at speeds as fast as the motor car will go, but that when the rail marker is used, best results are secured at speeds of approximately 10 miles per hour or less, particularly if it is desired to mark short variations.



General View of Mr. McMillan's Motor Car With the Automatic Gage Attachments

Timber Connectors Were Used to Advantage in the Bracing Connections of This High Trestle on the Santa Fe

Improved Timber Construction—

A War-Time Alternate for Steel

WITH traffic at an all-time peak, with much of it of a character that will not brook delay, and with demands for faster movement gaining in insistence, the railways are faced with the necessity for providing additional facilities and for altering and improving many of those already in service to insure the expeditious handling of this traffic and the moving of it dependably. Obviously, under these conditions they cannot restrict their construction and repair programs, but must continue both construction and maintenance at an accelerated rate to insure that there shall be no interruption to or interference with the steady flow of military equipment and supplies to our fighting forces.

Steel Supply Limited

Yet, in the face of these increasing demands for still further improvements in service, the railways are meeting severe restrictions in the use of materials they have long looked upon as essential to the prosecution of both construction and maintenance. Structural steel is a material that the present generation of engineers has considered essential for a wide variety of work, but the present need for steel for war purposes is so urgent, and the supply available for civilian uses so reduced, that railway engineers, in common with those in other fields, are being forced to consider substitute materials for the construction of many essential facilities. Timber offers the greatest possibilities as a substitute for structural steel in a wide range of applications, and the railways must make the widest possible use of it.

Until recently, one serious limitation to the use of timber for many construction purposes has been the low economy inherent in its use because of the relative weakness of the joints or points of intersection of the structural members. The reason for this was that no method had been devised for fastening these members adequately at the joints, making it necessary in a great number of instances to use sections larger than were required otherwise to support the load, to permit the application of more bolts, more nails or other fastenings to assure the integrity of these intersections under load. This resulted in such low economy in the use of the timber that wood fell more or less into disfavor for built-up construction, especially where heavy loads must be carried.

A New Design of Joint

During the last few years, however, the lumber industry has been seeking means for increasing the strength of timber joints, and placed the research leading to this objective in the hands of the Timber Engineering Company, Washington, D. C., a subsidiary of the National Lumber Manufacturers' Association. Starting with one or two devices that were developed in Europe originally, this company has designed a series of devices, known as timber connectors, which are able to spread the load over a large part of the cross section of the structural member, instead of concentrating it on the small area represented by the bolts or nails used as joint fastenings.

While timber connectors are by no means in universal use on the railways, their use has been increasing

steadily for several years, particularly since the Committee on Wood Bridges and Trestles made a favorable report on their use to the A.R.E.A. in 1936, and followed this with a further report in 1940. Among the roads that have been most active in using these devices to increase the value of connections between structural members, is the Atchison, Topeka & Santa Fe, which has been using them for several years for a variety of purposes.

As might be expected, since this road is notable for the large use it has made of treated piles and timber in trestles, the earliest use of timber connectors was in trestles. They were used in a small way beginning about 1935. So satisfactory were the results that the use of these devices was expanded considerably during the next and succeeding years, and today they are used for many purposes, although the largest use still remains in the construction of trestles.

Types Used by Santa Fe

Spike grids, toothed rings, split rings and shear plates have all been used, but recently the use of the toothed rings has been discontinued. The first three designs are adapted particularly for pile and timber trestles, while the fourth is used between wood and steel surfaces to develop the full shearing strength of the bolt or bolts used in the connection. In general, the single-curve grid is used between sway bracing and piles, while the toothed rings were used between the sway braces and the posts of timber bents but have now been replaced by split rings. Where split rings are used elsewhere in trestle construction, they are usually employed with the diagonal longitudinal or tower bracing members. This type of connector is also used to advantage in various types of roof-truss construction.

More recently, plain clamping plates have been employed for spacing ties on open-deck bridges. In making the application of these plates, the wood guard timber is placed in position on the ties and the holes for the holding-down bolts are bored. Then the clamping plates are seated, one on each tie, by means of a special tool that does not damage the teeth of the plates. Following this, the guard timber is again set in place and the bolts are drawn tight, after which this timber is seated by means of an 18 or 20-lb. maul, or a special ram, in the same manner as will be described for the sway bracing.

Materials for Victory

No. 1 of a Series

This article is the first of a series dealing with the conservation, substitution and reclamation of materials designed to help the war effort of our nation, and, at the same time, aid maintenance men in solving their new war-time problems. It describes the manner in which the Atchison, Topeka & Santa Fe uses timber connectors to make timber construction more effective and permit its use instead of structural steel

Spike grids and toothed rings are applied in the field without preliminary framing as the bents are assembled. Detailed instructions for their application and for seating them were incorporated in the plans for individual structures in 1936 and are still in effect. These instructions require that the connectors be placed concentric with the bolt holes, except where the bolts are not on the center line of the timber. In this case, the minimum distance allowed between the side of the connector and the edge of the timber is $\frac{5}{8}$ in.

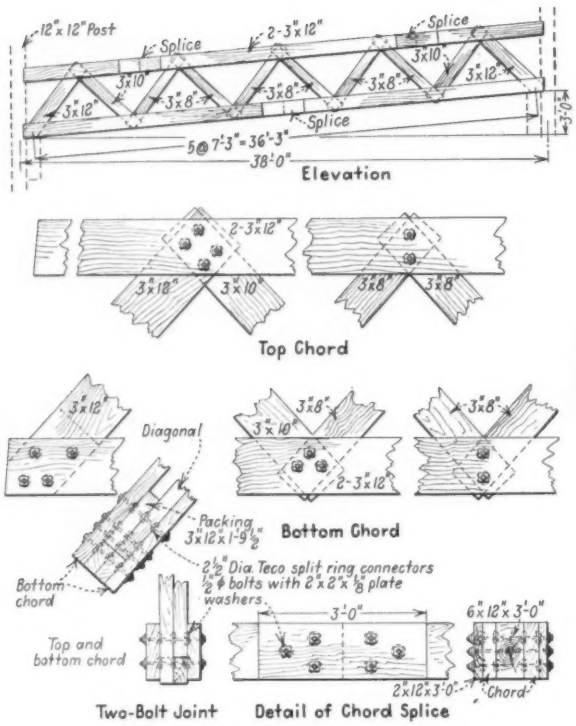
The instructions also require that when the brace is applied, all bolts shall be drawn up tight enough to hold it in place securely. Then, using a hardwood buffer or a steel plate to protect the wood, the grids are seated by striking the buffer with a maul. However, it is not permitted to seat any connector at one driving. Rather, the instructions require that the maul must be worked back and forth along the brace to insure that the spikes or teeth remain normal to the timbers until the connectors are fully seated. During this process, the bolts are kept tight at all times so that there can be no lateral or longitudinal movement to distort the pockets into which the spikes or teeth are being forced.

Applying Split Rings

Obviously, this method cannot be used with either the split rings or the shear plates, both of which require prepared pockets for their installation. Special tools are used for framing these pockets and this part of the framing is preferably done prior to the treatment of the timber. Since this is not possible in many cases, the pockets for the connectors can be prepared on the job, but since they are shallow they rarely extend below the zone of treatment, although they do cut through the zone of wood having the largest relative retention of the preservative.

In this connection, it is of interest that some months ago, preliminary

Connectors Were Also Used to Advantage in This 224-Ft. Ballasted-Deck Pile Trestle on the Santa Fe



Framing Details of An Enginehouse Roof Truss, Showing Use Made of Timber Connectors

to the reconstruction of part of the roof of an enginehouse at Bellfountaine, Ohio, the building forces of the Big Four preframed one complete truss joint for assembly by means of split-ring connectors, and sent it to the treating plant to assure themselves that there would be no distortion of the pockets for the rings or of the holes for the bolts by reason of swelling or warping of the wood during treatment. The test was entirely successful, for after treatment it was found that there was no swelling of the wood to interfere with the application of the connectors or the joint bolts.

How They Are Used

A specific example of the early use of the toothed-ring type of connector on the Santa Fe was at Bridge 676-A on the New Mexico division in 1936. This is a creosoted structure on a 1-deg. 30-min. curve, with five pile and three framed bents, the latter being supported on concrete footings. Four of the pile bents were buried in the embankment to such an extent that sway bracing was not called for, but about 12 ft. of the fifth bent was exposed, and sway bracing was applied to it as well as to the three framed bents.

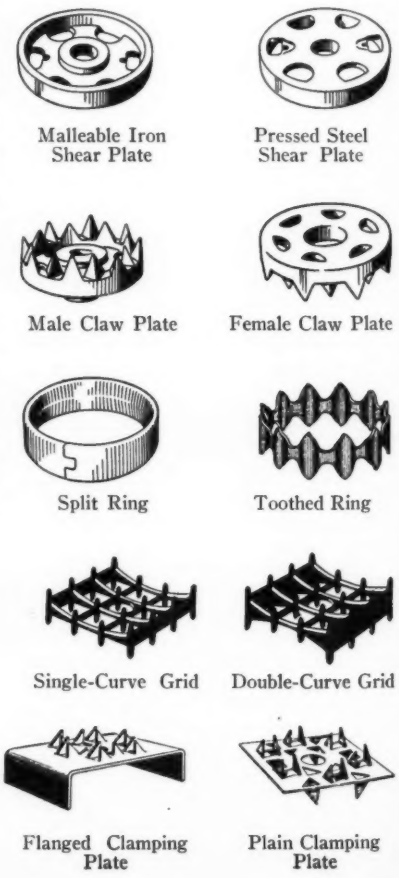
The framed bents each contain seven posts, the elevation for the curve being framed into the bents. The bracing for each bent consisted of two lines of sash braces, one slightly below the inclined cap and the other at approximately the mid-height of the bent, and two sets of X-braces, one above and the other below the lower sash brace. This arrangement of the bracing required 49 connectors to the bent or a total of 147 for the three bents. At that time the spike grids had not been developed, and 14 of the toothed-ring connectors were also used in the pile bent. Today single-curve spike grids are used between sway bracing and piles. All of the connectors were applied in the manner already described.

An example of the use of split-ring connectors is found in the new built-up wood roof trusses installed recently in the enginehouse at Belen, N. M. In this case from 6 to 12 split rings were used at the intersections, depending on the magnitude of the forces, and 16 were used at the chord splices, the number being the same for both compression and tension members. The trusses were 38 ft. long between centers of the supporting posts, and were 5 ft. deep. The upper and lower chords were each composed of two 3-in. by 12-in. timbers; the diagonal members were made up variously of timbers 3 in. by 8 in., 3 in. by 10 in., and 3 in. by 12 in. The lower chord was spliced at the center, while the upper chord has two spices, one near each quarter. The split rings were all 2½ in. in diameter, and ½-in. bolts, with 2-in. by 2-in. by ⅛-in. plate washers, were used in all connections and splices.

Shear Plates Are Employed

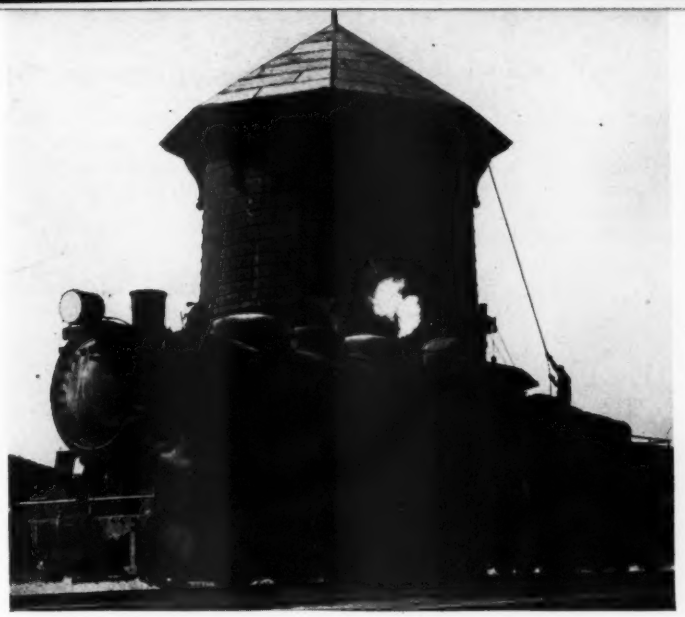
Shear plates and toothed-ring connectors were used in renewing members of a crane runway at the shop at Topeka, Kan., the tripod columns of which are of timber. In this case, only a few of the posts were renewed in their entirety, but timber that was badly season-checked was cut out and new pieces were inserted and spliced to the original timbers with fishing plates and toothed-ring connectors, 12 rings being used to a splice. At the top of each buttress post, steel plates are employed to

(Continued on page 479)



Various Types of Connectors That Are Finding Widespread Use in Timber Construction

The use of anti-foam compounds as a method of reducing the road blowing of engines is discussed in this abstract of a report presented at the annual convention of the American Railway Engineering Association by a sub-committee of the Committee on Water Service, Fire Protection and Sanitation. J. H. Davidson, water engineer, Missouri-Kansas-Texas, was chairman of the subcommittee preparing the report



Foaming Must Be Prevented or Overcome in Order to Get the Maximum Efficiency from Locomotives

FOAMING—

Its Causes and Methods of Control

FOR many years one of the most troublesome problems in locomotive operation has been the foaming and priming of water in the boilers. Because so many different explanations have been offered for the causes of foaming, and because highly erratic and unpredictable cases of foaming still occur, foaming and priming are still referred to as "the least understood of boiler phenomena." Since both foaming and priming result in "carryover," that is, the carrying along of water in the steam, it is easily understood why there has been much confusion in the use of these terms, resulting in the reporting of apparently contradictory experiences. In an attempt to differentiate between these two phenomena, the following definitions and comments are offered.

Foaming Defined

Foaming is the term applied to the action in a boiler when steam bubbles build up over the surface of the water to form a layer of foam which fills the steam space and carries over into the cylinders. This action depends on the amount and type of impurities present in the water. The impurities that become concentrated and cause foaming are dissolved solids and suspended matter, either of which may be of organic or inorganic origin. These impurities seem to increase the strength or tenacity of the thin films surrounding the steam bubbles, and as the bubbles rise to the surface they retain their films and collect to produce foam.

Whether the concentration of impurities will reach a critical point depends on the type of the locomotive boiler and the work done, the amount and character of the alkali salts present, and the amount and type of the suspended matter in the water. To prevent foaming, the concentration must be kept below the critical point by systematically blowing off the boiler, either manually or automatically. The cost of maintaining the concentration below the critical point equals the cost of pumping, treating, and heating to boiler temperature, the amount of water that is blown out. When the concentration of foaming salts is so great that it is impractical or uneconomical to blow off the necessary amount of water, anti-foam compounds may be used with good results.

Priming is the term applied to the instantaneous evolution of steam from a heating surface, which results in a large volume of water being carried into the steam space. This action is mechanical and may be due to defects in the design of the boiler, a sudden opening of the throttle, or the working of the boiler beyond its capacity. It is independent of the character of the water. While the effect upon the locomotive is temporarily the same, priming differs from foaming in that it can be controlled mechanically to a large extent by proper operation.

Desolved Solids a Yardstick

From the foregoing it is apparent that true foaming, as distinguished from priming, is dependent on the quantity and quality of the impurities in the water. Experience and research seem to indicate that the nature of the impurities in the water, especially the relative proportions of the various impurities, is of more importance than the total quantity present. However, until we have acquired more definite knowledge of the role of each of these factors in producing foaming, we can use the total dissolved solids as a sort of yardstick to measure the foaming tendency of boiler waters. In fact, in the majority of waters the tendency to foam is almost a straight-line function of the total dissolved solids. Since these solids can be easily and quickly determined, it is customary for water-conditioning chemists to use this determination to indicate the critical

point at which foaming may be expected to take place. For instance, experience has shown that foaming is not usually encountered until the total dissolved solids in the boiler water have reached a concentration of from 125 to 200 grains per U. S. gallon.

It is true that there are many exceptions to this rule. For example, the water may contain a certain kind of organic matter which may either aggravate or destroy the tendency to foam, or the relative proportions of certain salts may frequently be such that cases of foaming will be reported when the total solids are below the limits stated above; on the other hand, much higher concentrations are frequently carried with no foaming trouble. There is also evidence of some relationship between the number of times a water is concentrated and its foaming point. For example, waters of low concentratable solids will carry over at lower total concentrations than will waters of high concentratable solids. In spite of these and many other special cases which may arise from time to time, the fact remains that, at the present time, the total solids constitute our most dependable and convenient index for evaluating the tendency of boiler water to foam.

Blow-Down or Compound?

Having determined the critical concentration at which foaming occurs for any particular type of locomotive, working under fairly uniform conditions on a certain division, the question arises as to what method of controlling the foam will be the most desirable. As previously stated, we have the choice of two methods: (1) The dissolved and suspended materials in the boiler water may be kept safely below the critical point by the systematic blowing of the boiler; or (2) antifoam compound may be used.

Before the science of water conditioning for locomotives had reached its present advanced stage, it was customary for railroads operating in bad-water districts to wash and clean locomotive boilers or change water after each trip over a division, in order to keep down the accumulation of scale and mud. Now that scientific principles have been applied to the water-supply problem, with the elimination of many objectionable supplies and the proper conditioning of the water, many railroads have extended their washout periods to 30 days, and have in most cases been successful in controlling the foaming by systematically blowing off boilers, both on the road and at terminals. Information collected by this committee indicates that this is by far the most widely used method of controlling foaming, and the records show that many roads, which at one time used large quantities of anti-foam compound, no longer depend on it extensively.

Castor Oil

Long ago it was discovered that a few thousands of one per cent of castor oil will control most cases of true foaming within certain limits. The result is not permanent; hence, the oil has to be added continuously to the water in the boiler, and, once started, its use must be continued until the boiler is washed out. Overdosages react harmfully in causing the boiler to become "compound dirty," and actually increase the tendency to foaming. To adapt it for use in locomotive boilers, the oil is usually prepared in the form of an emulsion with various percentages of tannin extract. The percentage of castor oil varies from about 10 to 20 by weight. The prescribed quantity is usually dissolved in hot water and placed in the tender tank just before taking water.

Just how the castor oil works to prevent foaming is not yet clearly understood. While it is quite effective in most cases of true foaming, occasionally cases have been reported where it has had little effect. The cost of anti-foam compounds varies from about 6 to 15 cents per pound, and they are used in the proportion of one pound of the compound to from 4,000 to 12,000 gal. of water. Experience has shown that, even with the use of anti-foam compound, a critical concentration is finally reached beyond which the compound is not effective; then it becomes necessary to blow off the boiler or to change the water. Roughly speaking, the use of compound will permit an increase of from 75 to 100 per cent in the amount of dissolved solids that can be carried in the boiler water before foaming is encountered.

It is evident from the above that such compounds will not prevent foaming, but will merely postpone it, and that, regardless of whether anti-foam compound is used, resort must be had to the practice of blowing off the boilers if locomotives are operated for any considerable mileage between water changes or boiler washouts. This explains why most roads operating with 30-day washout periods prefer to depend entirely on blowing to control foaming.

In these references to anti-foaming compounds it should be understood that we are referring to the conventional type of compound which depends upon castor oil for its effectiveness. During the past year, experiments have been carried on with various organic materials, the use of which has in some cases made it possible to operate locomotive boilers with high concentrations of soluble salts and suspended matter without trouble due to foaming. The action of these materials is entirely different from that of castor oil, and they should be considered as water-conditioning chemicals rather than as anti-foam compounds. At present we do not have sufficient information concerning these materials to make any definite recommendations concerning their use. However, judging from some of the results obtained to date, they promise to develop into a valuable addition to our present methods of water conditioning.

A Complex Problem

Summing up what we have learned by research and experience concerning foaming and the various methods of controlling it, we must admit that it is an extremely complex problem which presents some questions that have not yet been answered to our satisfaction. Therefore, it is impossible to set forth a rigid recommendation that will be applicable to all cases. Where water of fairly good quality that has been properly conditioned is in use, undoubtedly the most satisfactory method of controlling foaming is by systematic blowing.

Under some conditions it may be uneconomical or impractical to depend entirely on blowing. For instance, there are some districts where the combination of circumstances, such as the quality of the water supply, the type of the locomotive in use at a particular time and the tonnage handled, may be such that the boiler cannot furnish all the steam required to do its work and at the same time permit sufficient water to be blown off to control foaming. Also, at times an actual shortage of water exists on certain districts and it is advisable under such circumstances to reduce blowing to a minimum. Again, there are districts where it is impossible to obtain any water excepting that containing such high concentrations of soluble salts that it is practically at the critical point before any concentration takes place in the boiler. In such cases as these the use of anti-foam compound would be economical.

While the locomotive water supplies in use on our railroads are steadily being improved in quality by the elimination of undesirable supplies and the proper conditioning of others, making it more and more advantageous to control foaming by the proper and systematic blowing-off of boilers, it is probable that conditions which make it desirable to use anti-foam compound will continue for some time.

Enough Creosote for Tie Treatment Seems Certain*

By John H. Forker
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John H. Forker

TO appraise correctly the creosote situation as a factor in the crosstie supplies of the railways, we must analyze the relationship of the materials necessary for the treatment of crossties and switch ties to the preservative materials used by the wood preserving industry as a whole. To do this, we must review the situation over the last decade, using this as a basis for our analysis of the present situation. In such a review, we find that in 1931, 138 million cubic feet of crossties were treated with creosote and creosote solutions. In that same year, approximately 155 million gallons of creosote and creosote solutions were used by the entire wood preserving industry. If we assume a 6-lb. treatment per cubic foot of tie, we find that approximately 97 million gallons of the creosote preservatives used in 1931 went into ties, which is 63 per cent of the total 155 million gallons used for all classes of treated material.

Continuing our review, we find that the number of ties treated during the next five years decreased. In 1937, however, approximately 139 million cubic feet were treated, and the total creosote and creosote solutions used amounted to 184 million gallons. In this year, the preservatives used in the treatment of cross and switch ties approximated 97½ million gallons, or about 53 per cent of the total of all materials used in timber preservation. It should be noted that the volume of creosote used for the treatment of ties in 1931 and 1937 was practically the same—about 97 million gallons, but that the total amount of such preservatives used increased from 155 million gallons to 184 million gallons.

The records for 1940, the last year for which we have complete data on treated ties and the total amount of preservatives used for all classes of wood preservation, show that 175 million gallons of creosote and creosote solutions were used. In that year, 134 million cubic feet of cross and switch ties were treated with the same preservatives, and the amount of creosote used was approximately 54 per cent of the total.

In 1931, the gallonage used in the production of treated ties amounted to 63 per cent of the total creosote and cresote solutions used by the entire wood preserving industry; in 1937, although the cubic feet of ties treated were approximately the same, the percentage of the total creosote used by the tie industry amounted to only 53 per cent. This means that more creosote was produced and used for other purposes in 1937, a trend which continued through 1940, and which, in my opinion, also continued through 1941, though I have no definite figures to support this statement.

Creosote Imports Decrease

In appraising the outlook for creosote as a factor in the tie supply of the railroads, let us consider the two following questions: (1) What percentage of the total creosote used for timber preservation was imported during the years 1931 to 1942? (2) What can American producers do to make up for the lack of imported creosote, and also to take care of the increased demand for this material due to war requirements?

In answering the first question, let us review the importation of creosote oil during the ten year period from 1931 through 1940. Imported creosote used for treatment during 1931, as reported by the wood preserving industry, amounted to 27 per cent of the total volume of creosote and creosote solutions used during that year. This decreased in both volume and percentage during the next five years, until 1937, when the quantity imported increased over 1931, but the percentage was only 19 percent. This situation also prevailed in 1940, when again the volume of imports was greater than in 1931, but when the percentage of the total used was only 17 per cent. In 1941, the percentage of imported creosote used was reduced considerably, yet domestic producers were able to increase their production enough to take up this deficiency and to supply the additional oil necessary for increased treatment. I feel certain that when the final figures for 1941 are compiled and tabulated, showing the gallons of creosote and creosote solutions used, they will greatly exceed those of 1940.

Domestic Production of Creosote Should Prove Adequate for Tie Requirements

In discussing the second question, let us assume that during the balance of 1942 and for the remaining years of this emergency, no more creosote oil will be imported into this country. When we consider the amount of imported creosote oil used during the years 1931 to 1940, which varied from 27 per cent to 17 per cent of the total creosote used, and, further, the decrease in the amount of creosote imported in 1941, which was a big year for the wood preserving industry, we must come to the conclusion that the tar distillers of the country produced as much and probably more creosote in 1941 than the total consumption of an average earlier year. Therefore, if crosstie treatment requires only 54 per cent of the total creosote used, it is easy to see that there is little likelihood of a shortage of creosote for the tie industry. In fact, it would not surprise me to find a shortage of ties more probable.

Must Spread Out Requirements

The production of creosote oil is, in the main, a uniform process that must be spread out over the year. If a tie distiller plans to produce 24 million gallons of creosote a year, he will produce it at the approximate rate of 2 million gallons a month. Moreover, this production will probably come from several widely separated plants. Therefore, if the demand comes too

(Continued on page 479)

*Abstract of an address presented before the twenty-fourth annual convention of the Railway Tie Association, at Cincinnati, Ohio.

All of the Departments of the Government, Military as Well as Civilian, Agree That Essential Railway Operations Must Not Be Interfered With During Blackout Periods

Maintenance Men

THE Coast lines of the Southern Pacific are ready for blackouts, and, in fact, have already participated effectively in many of them. On a moment's notice buildings are prepared to black out with the least interference with normal operations; signal, switch and exterior train lights have been hooded to prevent visibility from the air; and special precautions have been taken to obscure all interior train lighting, firebox flashes, and even white steam and smoke from locomotives that could, conceivably, betray night railway operations to enemy raiders. All of this has been done with the full approval of the army, the navy and the Office of Civilian Defense, which, like the railroad, recognizes that to slow down or to stop intensive railway operations during blackouts would serve the enemy even though his forces might be many miles away.

Buildings Darkened

Three principal problems were presented to the road by blackouts, while attempting to maintain normal operations in so far as possible. These were to obscure from overhead view its trains under operation, its system of roadway and yard signals, and its scattered hundreds of buildings of widely varying type and character. To meet the requirements of blackouts as regards its buildings, the road has followed, in general, the instructions and suggestions contained in the booklet entitled "Blackouts", issued by the National Civilian Defense Council and approved by the War Department. In line with these instructions and suggestions, the road is now prepared to black out its buildings, not alone where employment is irregular during night hours, but also all buildings, including shops, signal towers, passenger stations and offices, where operations usually continue regularly during the night.

Terminals A Problem

At those locations where night employment is not regular, the requirements for blackouts are met by extinguishing all lights and by stopping temporarily such work as may be under way. In all other buildings where night operations are essential, a variety of methods of obscuring light from windows have been employed, including the use of blackout paint, the provision of black shades and the installation of adjustable shutters or removable blackout wood panels. In this latter regard, the road is making extensive use of Douglas fir plywood window blackout panels, these being made of ¼-in. or 5/16-in. plywood, framed to fit snugly against the window casements, and readily installed or removed as conditions require. In its use of these various means, the railroad has held to the thought that, to the largest extent practicable, blackout measures should be such as to permit adequate ventilation under all conditions and should be readily removable during daylight hours.

Effecting blackouts at terminal passenger train sheds, and the handling of passengers, mail, baggage and express at the larger stations, have not been solved satisfactorily as yet, this being due largely to the fact that present general instructions for blackout observance prevent the movement of vehicular traffic in the city streets, and, consequently, make it impossible for passengers, as well as baggage, mail and express, to reach passenger stations during blackouts. Under these conditions, where a blackout occurs at or immediately preceding the leaving time of a passenger train, the train is held until the end of the blackout period in order to receive its passengers, and mail, baggage and express, if any. During the time that trains are held under these conditions, the train platform lights are extinguished, as there is little movement of passengers and practically no work to be done. If later revisions of the general blackout requirements permit vehicle operation to and from stations in the city streets, means will be devised to permit the loading of trains during blackout periods under limited lighting conditions.

Switch Lights Hooded

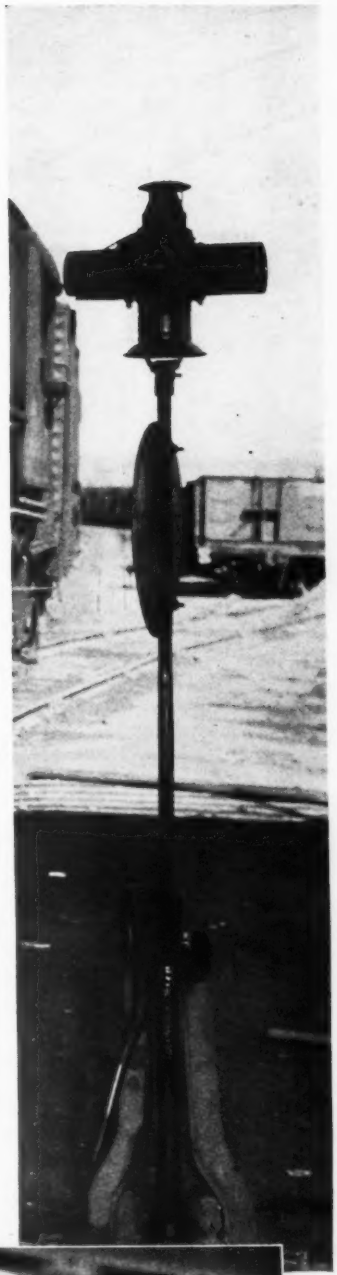
To make blackouts effective so far as roadway signals are concerned, all automatic block, train order and interlocking signals have been shielded or hooded, these hoods, of sheet iron, varying in shape and size to meet the requirements of the different types of units involved, and extending out from the lenses or roundels in each case a sufficient distance to cut off upward beams of light—usually from 10 to 24 in. Wig-wag crossing lights and switch lights on the main line and in yards are also hooded, the hoods on these lights extending out from 4 to 4½ in. beyond the lenses. In all cases, these hoods are painted a dead black. Like the signal lamp hoods, these latter hoods are also of sheet iron, except in the case of switch lights where clearances have been impaired, in which case a flexible material has been used.

A special blackout precaution adopted for all switch lights is to

Help BLACK OUT

the Southern Pacific

Coast lines of this road are prepared to obscure train, building and switch and signal lights from overhead, with minimum interference with normal operations. While all departments have had a part in these precautions, this article tells particularly of measures taken by the track and building forces



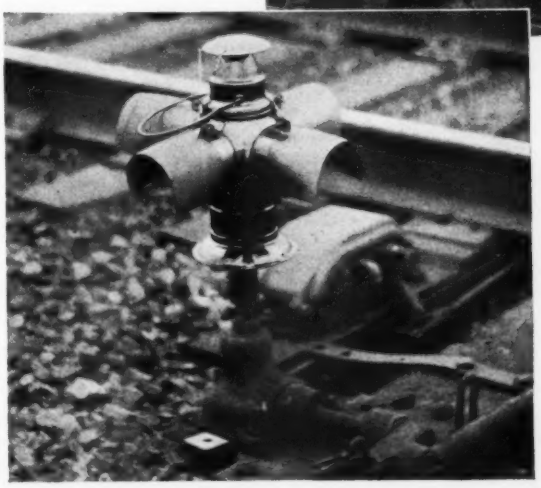
paint the lower segments of their lenses black, it having been found in many cases that the light emitted from the lower portion of the lense produces a reflection on the track rails which is quite noticeable from overhead. Painting the lower segments of the lenses, usually up to the lower limits of the center bull's-eye, eliminates this reflected light to the point where it is not objectionable.

In the past, the public commissions having jurisdiction over the railways in California and Oregon have, in some instances, required supplemental lights at grade crossing signals. However, since the event of blackouts on the Coast, the commissions in both of these states have issued orders releasing the railroads from the requirements of their previous orders or decisions as to these lights, where it becomes necessary to extinguish them to meet the blackout requirements of the Regional Defense Council. All hand lanterns used by crossing watchmen are hooded to cut off any upward beams, and when not in use protecting trains, watchmen are required to shield their lanterns or to obscure them otherwise from view.

With the blacking out of train lighting equally as important as that of building and signal lights, and in many instances more so, the measures taken on the Coast lines of the Southern Pacific during blackouts to prevent the discernment of trains from overhead are even more positive and stringent than in the case of buildings and signals, extending in part, to all night hours, for the duration of the war, regardless of specific blackouts or blackout areas. Additional study is being made on the road in connection with all phases of its blackout precautions, and it is planned that adjustments in details and methods will be adopted as may appear desirable with further experience.

Confusion at First

With the beginning of the present emergency on December 7, 1941, making the blackout a reality on the Pacific coast, there was considerable confusion among local and state civilian defense councils as to how blackouts should be conducted and the action to be taken by the railroads, which, in some instances practically stopped train operation during blackout periods. This was contrary to the desires and needs of the army and the navy, each of which was calling upon the railways for the greatest effort in the prompt handling of materials, equipment and men, and who, while mindful of the importance of concealing vital railway installations and tell-tale train movements from the



Right, Above—A High Switch Stand With Metal Lamp Hoods. Right—A Low Stand With Hoods of Flexible Material

enemy, realized that the enemy would be served to a large degree if vital railway operations were slowed down materially or brought to a standstill for any cause. Therefore, hastily-arranged conferences between representatives of the railway, the army, the navy and regional defense organizations were called to determine the railroads' part during blackouts.

Among other things, these conferences set up the major principle that the railroads, in so far as possible, must continue their operations during blackout periods. At the same time, the Civilian Defense Council issued instructions to state officers that all instructions to the railroads as to the observance of blackouts would be handled by the regional office of the council, and that neither they nor any local defense council should issue instructions relative to the observance of blackout conditions on the railways that would affect the operation of trains. These principles simplified the problem of the road as it set out to black out effectively, while interfering to the least extent with normal operations.

Check Hose in Water Periodically for Wasteful Leaks

Must Conserve Oxygen

Maintenance Men Can Help

Pressed by the largely increased demands of war industries for oxygen, the gas manufacturers of the country are calling upon all users for the maximum avoidance of waste in oxy-acetylene cutting and welding in the interest of all industry, including the railways. This article is intended as a check list to help maintenance men do their part in preventing an already serious situation from becoming critical

Long Hose is Cumbersome. Requires More Pressure

KEEPING war production industries supplied with an unceasing flow of oxygen and acetylene for welding and cutting operations is no less essential today than providing the materials needed for war production. The demand for these gases has increased enormously. For some time, the gas manufacturers of the country have been hampered in their efforts to meet this demand by a shortage of cylinders to transport gases. Now there has arisen another source of concern. The oxygen producing capacity of the oxy-acetylene industry is being strained to the fullest extent in attempting to keep abreast of constantly pyramiding requirements for oxygen. In spite of large additions to plant capacity, a critical situation faces this industry—and to some extent all industries relying upon these gases for their operations—unless efforts are made by all classes of users to conserve, particularly in the use of oxygen.

In the mitigation of this situation, railway engineering and maintenance men, who are among the large normal users of oxygen and acetylene gases for an increasing number of operations in track, bridge, building and water service work, have an important part to play, both in their own

Excessive Pressures Waste Oxygen

selfish interest to insure an adequate supply of these gases for their own use, and in the interest of the country's war production, which today must have the "tools" to do the herculean job of equipping not only its own fighting forces, but those of practically all of the United Nations as well.

The following list of recommended practices is based upon observation of correctible wasteful practices found quite generally in oxy-acetylene welding and cutting. The elimination of these practices will not only go a long way toward relieving the "tight" oxygen situation, and in insuring an interrupted supply of gas to all users, but will also prove economical to the individual user. That the gas losses resulted from careless practices can be astonishingly large is seen in the fact that one user, for example, was found, unknowingly, to be wasting approximately 25 per cent of its oxygen consumption, through an accumulation of "insignificant" losses.

Observe These Practices

Use the proper size torch tip.—The use of a No. 2 tip instead of a No. 1 tip for cutting ½-in. plate consumes 10 to 20 per cent more oxygen and 16 per cent more acetylene—all of which is wasted.

Close cylinder valves when the torch is not in use.—If only the torch valves are closed, gas pressure in the hose rises and may force leaks.

Check hose and connections for leaks.—Such leaks may be infinitesimal, but a 1/64-in. diameter leak in a hose operating at 100-lb. pressure will waste 290 cu. ft. of oxygen in 24 hr.—more than a tank full.

Use the correct diameter of hose.—Hose that is too small for the job requires a higher gage pressure to secure sufficient flow.

Use short lengths of hose.—Unnecessarily long hose also requires a

higher pressure to overcome the pressure drop in the hose. Also, the surplus length, while adding nothing to the performance of the work, is subject to unnecessary wear and tear.

Use all of the gas in each cylinder before connecting a new one.—Drain every cylinder before disconnecting it. In the larger operations, interruptions of work to change tanks can be eliminated by the manifolding of gas cylinders, or by installing pipe lines.

Keep cylinder inventories low.—The old custom of keeping plenty of reserve cylinders must be abandoned, for it "freezes" them at a time when their rapid turnover is imperative. Railway maintenance men can help by ordering fewer cylinders more often, and by returning them promptly.

Keep tips clean and free from carbon and slag.—An unclean tip is an inefficient tip. Congested orifices nullify the value of using proper pressures and speeds, resulting in lower efficiency and waste of gas.

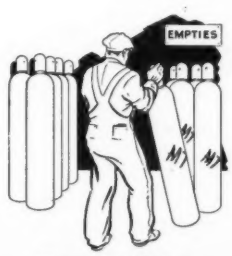
Handle hose with care.—Because hose is made of rubber, it is most important that it be made to last as long as possible. To insure this, it must be protected against mistreatment which promotes leaks. Therefore, keep hose out of range of hot oxide and sparks; wash off oil and grease, which ruin rubber, place a plank on each side of the hose where it crosses truck runways; store any hose stocks in a cool, dark place; and when a hose is damaged, cut out the bad portion and splice the ends together with standard splicing nipples.

Don'ts

Don't use excessive pressures.—This is one of the most common malpractices in cutting operations. Manufacturers' rated pressures are the most efficient for average conditions.

Don't leave torches burning when not in use.—If a torch burns idly for even as little as three minutes of each hour, it is wasting five per cent of its gas consumption. Five per cent of last year's industrial oxygen consumption was 360 million cubic feet.

Don't abuse cylinders.—A damaged cylinder must be taken out of circulation, and contributes nothing while undergoing repairs.



Return Cylinders Promptly

The foregoing material is based upon information made available by the

Close Cylinder Valve When Finished

Air Reduction Sales Company, New York, as a part of the "Fight Waste" program which it is conducting in the interest of the country's war effort.

Improved Timber Construction

(Continued from page 472)

attach braces for preventing lateral movement of the runway rail and its supporting I-beam, while at the bottom, steel straps hold the posts securely in the foot or anchor castings. To insure development of the full strength of the plates and of the bolts securing them, shear plates were used between the metal and wood surfaces.

So far, these four types are the only ones that have been employed generally on the Santa Fe, but the examples cited are typical of the manner in which they are being used, although the illustrations include only a few types of structures. They do illustrate the fact, however, that in the emergency that is confronting the nation, engineers are afforded an opportunity to conserve a vital war material by using a substitute that is easily available to them.

Other Types Available

In addition to the four designs that have been mentioned, others are available, including flat, double-curve and circular spike grids, plain and flanged clamping plates, malleable-iron shear plates and two designs of clawplates. There are thus available to engineers a wide range of types and designs that are adapted for many purposes, which will enable them to increase materially the value of the joints between wood members and between wood and steel members.

Railway engineers are, therefore, in position to employ wood in many structures in which they have heretofore employed structural steel, and thus avoid the use of the latter, with the assurance that the timber will be used with marked economy compared with only a few years ago, before these devices became available to them. In this way, the supply of steel will be conserved for the fighting forces and the construction and maintenance programs, so necessary to the railways and to the nation, can be carried on with no interference with military needs.

Enough Creosote for Tie Treatment

(Continued from page 475)

early or too quickly, there are bound to be some temporary and local shortages. In other words, the distiller cannot ship his whole year's production from any one point or in the first six months of the year. If shortages have occurred in some localities, I am sure that they can be eliminated by a little more planning and co-operation between the treaters and the distillers.

More creosote oil is being furnished to treating companies during the present emergency through the waiving of specification demands that decrease the distilling capacity of producers and lower the production of regular distillate. Moreover, the amount of distillate has increased, and, no doubt, will increase further, because of demands made upon the tie distillers by the government, to produce more and more naphthalene, phenols, cresols, and other chemicals that are so essential in the production of necessary materials of war.

The most unfavorable factors in the creosote situation at the present appear to be problems of transportation. The scarcity of tank steamers and the difficulty of operating them satisfactorily along our coast have thrown an overload on the nation's tank car facilities. If the tank cars that are now carrying petroleum products from Texas and Gulf ports to the eastern territory, could be used for the hauling of creosote on return trips, and the higher freight costs absorbed, much could be accomplished in expediting the delivery of the creosote needed in the Southwest.

So far as I can see, there is no lack of cresote oil production facilities in the country. There will be no real shortage of creosote oil for the wood preserving industry, and, if the ties are produced, they can be treated and furnished to the railways.

A.R.E.A. Suggests How to Conserve Critical Materials*

Substitutes Must Be Found for Cast Iron and Corrugated Sheet Metal Culverts

THE American Railway Engineering Association, functioning under a new emergency set-up, including "emergency committee" representing its standing committees and Board of Direction, intended to meet the exigencies of war conditions, and particularly those arising from the scarcity of critical materials, has promulgated a number of emergency measures in the interest of material conservation, simplification, substitution and reclamation, which it is recommending to the railways for adoption for the duration of the war. These measures, which have been issued in the form of "emergency provisions" affecting certain specifications in the Manual of Recommended Practice of the association, as lists of recommended specifications for exclusive use during the war, and as suggestions submitted in circular letters to the chief engineering officers of member roads of the Association of American Railroads, already affect many of the materials being used by the engineering and maintenance forces.

Emergency Committees

To put its new plan into operation, President H. R. Clarke of the association appointed the following emergency committees:

Board of Direction

H. R. Clarke (chairman), ch. engr. m. of w., C. B. & Q., Chicago; F. R. Layng, ch. engr., B. & L. E., Greenville, Pa.; E. M. Hastings, ch. engr., R. F. & P., Richmond, Va.; and A. R. Wilson, engr. b. & b., Penna., Philadelphia, Pa.

Roadway and Track Problems

W. H. Penfield (chairman), ch. engr., C. M. St. P. & P., Chicago; J. B. Akers, asst. ch. engr., Sou., Washington, D. C.; S. E. Armstrong, engr. m. of w., N. Y. C., New York; H. R. Clarke, ch. engr. m. of w., C. B. & Q., Chicago; C. J. Geyer, engr. m. of w., C. & O., Richmond, Va. and J. L. Gressitt, asst. ch. engr., maintenance, Penna., Philadelphia, Pa.

Structural Problems

J. E. Bernhardt (chairman), br. engr., C. & E. I., Chicago; R. P. Hart, br. engr., M. P., St. Louis, Mo.; J. F. Leonard, engr. b. & b., Penna., Pittsburgh, Pa.; and C. E. Sloan, engr. of br., B. & O., Baltimore, Md.

Water Supply and Water Treatment

R. C. Bardwell (chairman), supt. water supply, C. & O., Richmond, Va.; R. E. Coughlan, engr. of tests, C. & N. W., Chicago; W. L. Curtiss, mech. engr., N. Y. C., New York; and A. B. Pierce, engr. of water supply, Sou., Washington, D. C.

Ties and Wood Preservation

H. R. Duncan (chairman), supt. timber preservation, C. B. & Q., Galesburg, Ill.; R. S. Belcher, mgr. treating plants, A. T. & S. F., Topeka, Kan.; W. J. Burton, asst. to ch. engr., M. P., St. Louis, Mo.; and W. D. Simpson, asst. ch. engr. m. of w., Seaboard, Norfolk, Va.

Trackwork Plans Abridged

Early in its considerations, the Committee on Track reviewed critically the Portfolio of Trackwork Plans of the association and developed an emergency provision which places a limitation on the use of certain plans for the duration of the emergency, with the primary object of restricting the use of manganese steel. The substance of this provision is that:

1. The use of the following plans be suspended for the duration of the war.
   Plan 220-42 Manganese steel points for split switches.
   Plan 503-40 Guard rails, tee rail design, with planed flares and canted plates.
   Plan 773-40 Solid manganese steel crossing—Angles 40 deg.—25 deg., inclusive.
   Plan 774-41 Crossings with solid manganese steel frogs, angles below 25 deg. and above 14 deg. 15 min.
   Plan 775-41 Crossings with solid manganese steel frogs, angles 14 deg. 15 min. to 8 deg. 10 min., inclusive.
   Plan 983-35 Solid manganese steel frogs for 7-in. and 9-in. girder rails.
2. The portion of Plan 821-42 showing rail-bound and solid manganese steel knuckle rails be suspended for the duration of the war.
3. The title of Plan 772-40 be revised to read "Solid Manganese Steel Crossings, Angles Below 60 deg. to 45 deg." for the duration of the war.

The Committee on Track has also recommended the adoption of a thoroughly considered procedure with respect to the furnishing of tie plates, with the object of reducing the number of designs of plates that will be furnished during the war.

How to Conserve Rubber

With rubber one of the most critical of the critical war materials, the recommendations of a special committee, appointed to give consideration to the conservation of rubber for those miscellaneous uses in connection with roadway and structures, are of particular interest to the maintenance of way and structures forces of the railways. Those recommendations of the committee which deal primarily with practices in the purchase of materials containing rubber, or for which rubber is sometimes used, and with practices designed to reduce the use of rubber, are as follows:

Recommendations Regarding Purchase

Gaskets—1-a. General—Specify prefabricated gaskets of substitute materials wherever possible.

1-b. Doors of Refrigerator Rooms—should be furnished with gaskets made of substitute materials.

Packing for Pumps—2. Composition (material other than rubber) is now generally used.

Weather Strips—3. Use felt or other substitute materials.

Valves for Locomotive Sand Plants—4. All-metal valves can be substituted in new work, but the use of rubber cannot be avoided in replacements. Not a large item.

Rubber Gloves—5. For batteries and high-tension work, use types covered by Telegraph and Telephone section specifications. Such gloves cannot be dispensed with.

Rubber Boots—6. Governed by general trade practice. Must be provided for some classes of work.

Rain Coats—7. Substitute oilskins.

Bumpers and Shock Absorbers—8. For per-

* The information contained in this article is based on a report prepared by W. S. Lacher, secretary of the A.R.E.A., to appear in Bulletin 432 of the association, for June-July.

cussion tools. Substitute springs or other forms of shock absorbers where possible.

Water Columns—Water Tank Outlet Valves—9. Manufacturers contend that use of rubber has already been reduced to a minimum by the substitution of composition packing. However, something like 10 pieces of rubber, weighing about 4½ lb. total, are still required for water columns, and of this quantity, about 2 lb. are in special molded forms requiring considerable new gum. These cannot be eliminated or altered without changes in the design of the facility which, of course, would not affect replacements of gaskets or packing all equipment now in service.

Power Tie Adzers—10. Guards around cutting heads are made of rubber known as "tire tread stock"—about 3,500 lbs. used in 1941. Steel plate guards were used originally but are not nearly as safe in stopping flying gravel, pieces of spike stubs, etc. A saving in rubber can be made here, but at some sacrifice of safety.

Practices Designed to Reduce Demand

General—Purchase of the best quality of rubber goods will usually insure lowest consumption of a given quantity of rubber.

Hose—1-a. Protect against wear, injury from rough handling and burning. Avoid exposure to the hot sun or other sources of high temperature and keep away from oils or greases.

1-b. Substitute pipe with flexible joints or with shortest possible lengths of hose.

1-c. Avoid need for replacements as long as possible by cutting off damaged ends or cutting out injured section and splicing.

1-d. Where possible, hose should be drained, coiled and properly protected against damage and theft when not in use.

1-e. Use the proper type of hose for the work undertaken. Avoid placing low-pressure hose on high-pressure lines. Do not use steam in water hose.

Belts—2-a. Protect against wear. Use dressing to prevent slipping.

2-b. Avoid renewals by patching and splicing. However, endless belts, which cannot be spliced, will give longer life than a spliced belt.

2-c. Protect belts from dampness or exposure to weather.

Gaskets—3-a. Use the correct type and shape of gasket for a particular location. In dismantling a line, remove gaskets carefully so they may be reused. It should rarely be necessary to replace gaskets if care is taken in loosening joints.

3-b. Use prefabricated gaskets wherever possible instead of cutting them out of sheet rubber. Prefabricated gaskets are far superior to gaskets cut from a rubber sheet, which is a wasteful practice.

3-c. Use roofing paper, asbestos sheets or white lead on canvas, where possible.

Pump Packing—4. Install carefully and apply no more pressure than is necessary to avoid leaks. Do not attempt to prevent leaks due to scored rods and plungers by applying excessive pressure. True up the rods.

Plumbing—5-a. Endeavor to control use so as to avoid abuse. Consider greater use of locks on toilet facilities to confine use to railroad patrons, and educate employees.

5-b. Make canvass of fixtures on property to ascertain extent of possible surplus and take unnecessary units out of service so that parts may be used for replacements.

5-c. Use reversible rubber flush balls in water closet tanks, thereby increasing the service life of flush balls.

Rubber Boots—6-a. If practicable, furnish knee length boots for work in water that does not make hip boots necessary.

6-b. Provide guard for application either to shovels or to boots that will prevent wear or cutting of the boots when stepping on the shovel.

6-c. Protect boots from damage or rough handling on the job or while being taken to and from the work, and see that they are stored properly when not in use.

7. Some railroads are reclaiming punctured gloves by vulcanizing.

Other Materials Affected

Carrying further its policy of disseminating promptly emergency committee recommendations and other helpful information, the association sent out a second circular of recommendations for the conservation of other critical materials, based on the work of its committees, urging that member roads carry out the recommendations in so far as possible. The context of this circular, dealing with bridges, culverts, fence posts and track, was as follows:

Bridges—Use wood or concrete in all cases where steel is not absolutely imperative. Concrete designs should be such as to require a minimum of reinforcement. In necessary steel designs use medium steel only (ASTM A7-39).

Culverts—The use of steel or cast iron pipe must be avoided. Use wood, concrete or vitrified clay pipe.

Fence Posts—Use wood posts.

Track—A potential shortage of manganese demands the utmost economy in the use of this material. The Committee on Rail has carefully considered the feasibility of a reduction in the manganese content of rail steel, but, because of the hazard to defense traffic involved on any adjustment of the chemistry of rail steel, it was forced to recommend against any change at this time. On the other hand, the Committee on Track, which concurrently studied the use of manganese steel in special trackwork, definitely recommends that designs involving the use of manganese steel be confined to locations imposing exceptionally severe service.

A third circular dealing exclusively with the restricted use of iron and steel in bridges and culverts, was sent to the chief engineering office of member roads on June 23. This circular, based upon a suggestion by Andrew Stevenson, chief, Transportation Equipment Branch, WPB, suggesting that the railways confine their orders for steel plates to widths less than 48 in., contains the following recommendations, prepared by the Committee on Wood Bridges and Trestles to limit to a minimum the use of iron and steel in railway bridges and culverts:

(a) Use creosoted timber instead of reinforced concrete or metal for ballasted decks on steel spans.

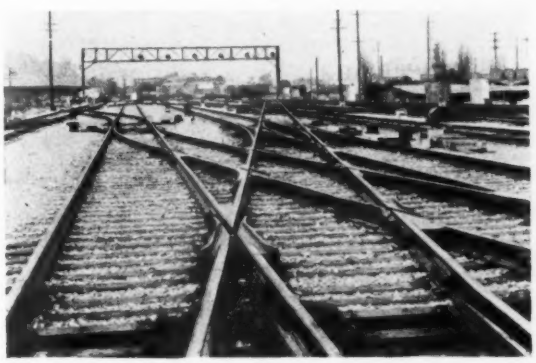
(b) Use Wakefield sheet piling instead of steel sheet piling for cofferdam construction.

(c) Use creosoted timber box culverts instead of metal pipe culverts or reinforced concrete box or pipe culverts. (Guard against infringement on patented construction).

(d) Use creosoted timber instead of pressed metal or reinforced concrete sections for the construction of crib retaining walls.

(e) Use laminated wood sections of small sizes of lumber as substitutes for larger timbers where large timbers are not available. In so doing, attention must be given to the details of connectors.

It is understood that all of the foregoing measures have an emergency status and will cease to be effective with the termination of the present war emergency.



Limitations Have Been Placed on Certain Plans for Special Trackwork Which Call for the Use of Manganese Steel

WHAT'S the Answer?

Substitutes for Steel Sash

In view of the restrictions placed on the use of steel and other metals, what substitute materials can be employed for sash in shops, office and other buildings? What precautions should be observed?

Recommends Wood

By A. T. Hawk
Engineer Architect, Chicago, Rock Island & Pacific, Chicago

Until a comparatively short time ago we always employed wood for sash, and it served us well. The sash in our general office building in the La Salle Street station are more than 40 years old and they are in nearly perfect condition, despite the fact that painting at the right time has frequently been neglected. We have several shop buildings in Chicago that were built in 1858 in which the original sash and frames, now 84 years old, are still in service. Owing to changed operating conditions in recent years, these old structures are no longer used as intensively as they once were, and maintenance has been neglected, yet the wooden window frames and sash are still functioning satisfactorily.

Steel sash came into general use after they were introduced into the construction of large industrial buildings where maximum daylighting was necessary. It solved this problem, and it will be difficult to find a substitute for the steel sash for this class of buildings. On the other hand, we have fallen into the habit of using steel sash in many other types of structures, large and small, of frame, brick, tile and concrete construction, regardless of whether wood sash might be equally suitable from the standpoints of appearance, general utility and future maintenance.

In many types of structures, excluding the larger industrial type, wood sash will have the following advantages, compared with steel sash:

1. In appearance they lend distinction to all types of architecture; they are available in every standard shape and size; and they are strong, lasting and economical.
2. Weatherstripping can be applied to them with greater effectiveness and at less cost.
3. Storm sash and screens cost less when applied to wood windows and frames, and are more effective for the exclusion of insects during the summer and for comfort and fuel saving in winter.
4. Paint adheres better to wood because it penetrates below the surface, for which reason wood sash requires painting less frequently. Paint scratches on wood surfaces do not result in rust stains.
5. The high humidity of air conditioning does not cause wood to frost, drip or sweat.
6. Wood windows are tighter and are poorer conductors of heat, thus assuring a saving in the cost of heating the building. They do not leak and in damp, cold weather they stay tight because they do not contract at low temperatures.

Much has been written and more has been said to the effect that wood sash for windows has had its day. One of the most common charges against wood is that it rots and must, therefore, be replaced. This may be true if, in these days of high prices and cheap substitutes, care is not exercised to insure that the right grade of lumber is used for the sash, and that the manufacture of the sash and frames is done properly. In the Manual of the American Railway Engineering Association, the Committee on Buildings has a very exact specification covering

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in September

1. *What is the most effective method for spot surfacing track? Why?*
2. *What preparatory work should be done in advance of insulating an existing building? Why? What precautions, if any, should be taken?*
3. *When transposing rail on curves, should the wear on the outer or inner rail govern the time for making the transposition? Why? How is the limit of this wear determined?*
4. *Is second-hand timber suitable for bulkheads at the ends of timber trestles? If not, why? If so, what are the advantages and under what conditions should it be used?*
5. *Should the wheels of light-inspection and one-man motor cars be set to a wider gage than section and other gang cars? Why? If so, how much?*
6. *Is it desirable to provide water columns with locks other than those installed by the manufacturer? Why? If so, what form of lock?*
7. *In view of the difficulty of procuring repair materials, what special arrangements should now be made to care for current maintenance and forestall breakage or other failure of parts on equipment assigned to gangs engaged in laying rail, ballasting, etc.?*
8. *How can a tin or a galvanized-iron roof be patched without using either of these critical materials?*

wood sash which will assure an excellent product. It is fully as important, however, that a good quality of wood, with respect to species, grade and seasoning—air and kiln drying—be employed, as that the workmanship shall conform to specifications.

To insure the best results, one should select a wood that will stand up the best in the locality where the sash are to be used. Northern white pine has been the species of wood that has been the most generally successful for sash. It has all of the good qualities required for long life; it is easily machined, it takes paint well and will stand more abuse from deferred painting than any other wood. Its only drawback is that the supply is getting scarce and it is, therefore, expensive in first cost, but it can be obtained. It should be remembered that only a few board feet are required for a window and, while the cost of white-pine lumber per thousand board feet is high, the cost of the small amount going into a window should be within the means of any one who is able to buy a window.

All-heart red cypress, Gulf type, is an excellent material for sash and frames, but one must be certain that he is getting this species instead of the white or yellow cypress, inland type. Ponderosa pine and California sugar pine are the woods that now are used most commonly in the manufacture of window sash. If either of these woods is to be used, it should be given one of the "clean" preservative treatments that are now available.

To all appearances, for the duration, we will have to get along without steel sash. Except for large window openings in the industrial types of buildings, there is no reason why we cannot substitute wood, often to advantage. We should be careful, however, to select the correct species, grade and treatment to give long life, so that in a few years we will not be confronted with replacement expense.

Glass Blocks Acceptable

By Frank R. Judd

Engineer of Buildings, Illinois Central, Chicago

Glass blocks should be acceptable as a substitute for window frames and sash in the buildings mentioned in the question. Wood sash can also be used. The original cost of the glass blocks will be higher than that for steel or wood frames and sash, but the subsequent cost for maintenance will be less. With respect to the second part of the question regarding the precautions that should be observed—sash and frames should be cleaned thoroughly and painted before the paint now on them has deteriorated to the point where the wood or metal is exposed to the weather. Attention should also be given to renewing putty when needed, using the best grade of putty.

Tie Plates and Buckling Track

Do double-shoulder tie plates prevent or retard the buckling of track? Why? To what extent? What other forces are operative?

They Increase Rigidity

By H. R. Clark

Chief Engineer, Maintenance of Way, Chicago, Burlington & Quincy, Chicago

Since overtight rail is the cause of track buckling, anything that tends to retard movement of the rail and consequent tightness at certain points will to that extent retard buckling of the track. It is agreed generally that double-shoulder tie plates act to some extent as rail anchors, since the shoulders engage the edges of the rail base if the ties become slewed. They also add materially to the strength of the track structure, holding the rail more definitely in position and, to that extent, add to the general rigidity of the track.

I believe, however, that the extent to which they retard the buckling of the track is limited; certainly they should not be depended on to prevent it. To prevent buckling, care should be exercised to provide correct expansion allowance when the rail is laid, and at the same time enough anti-creepers should be applied to insure the maintenance of this expansion under traffic. Even under the most favorable conditions and the best of maintenance, there will be some movement of the rail, with resulting bunching of expansion. This should be watched for and guarded against by keeping the anchors set up and operating to their capacity at all times, as well as by making sure that the joints are not frozen, but that the rail is free to move under the forces of expansion and contraction. This involves maintenance of correct bolt tension, sufficient to support the rail ends, yet not so high as to freeze the joints and prevent expansion and contraction of the rail. Unless this is watched, the track forces are likely to be misled into thinking that expansion space is available to them when, as a matter of fact, it is not.

As suggested, it is essential that the correct allowance for expansion be provided originally; it is equally important, however, that this be not overdone. With the present heavy rail sections, double-shoulder tie plates, large ties, well-ballasted track and the use of the requisite number of anti-creepers, track is much stronger and more rigid today than formerly, and expansion can be controlled more accurately, for which reason the allowance can be reduced safely. Rail-end batter and general joint wear will be reduced appreciably by reduction of the expansion gap and the uniform maintenance of this gap at all times.

They Aid Materially

By W. L. Roller

Division Engineer, Chesapeake & Ohio, Columbus, Ohio

Any facility or device that adds to the stiffness of the track assists in holding it in line by providing resistance to lateral motion. There is little doubt that double-shoulder tie pates, particularly these provided with hold-down devices, aid materially in prevention of buckling. Double-shoulder tie plates, like heavier rail, full-ballast cribs, full spiking, larger ties and anti-creepers, tend to resist the forces that cause buckling. Wherever this is possible, the most effective means to prevent track buckling is to eliminate the factors which tend to promote conditions that lead to the direct or immediate causes of buckling by creating distortion of the track.

Some of the causes leading to buckling track are (1) rail creepage; (2) freezing of the rail joints; (3) unequal space for expansion at the joints; and (4) inadequately ballasted tracks. Rail creepage is the most common cause for buckling track. If the rail is permitted or caused to remain where it was originally and is provided with sufficient space to expand and contract as the temperature changes, there will be no buckling of the track. The creeping of the rails under the wheels of locomotives and cars causes "bunching" or loss of expansion, thus creating a situation where a quick rise in temperature will cause the track to buckle. It has been demonstrated that where the rails are anchored individually and firmly, the stresses set up at any point are not

sufficient to create track distortion. Adequate anchorage is, therefore, the most vital factor in preventing kinks.

In the freezing of joint bars, the principle of individual expansion for each rail is defeated. It is highly important, therefore, that provision be made for the movement of the rail within the joint. To insure this, the fishing surfaces of the rail and joint bars should be oiled and the bolt tension should be such as to permit this movement. This item of maintenance is often neglected. Frequent checks should be made, particularly as the hot summer weather approaches, to detect any tendency toward freezing. This can be done by "cracking" the bolts in the joints. This check should be made in all cases before tracks are raised for out-of-face surfacing, and especially if the track is to be skeletonized. Freezing of the joints is more likely to occur on light-traffic lines than on those having a dense traffic.

An unequal distribution of the gaps or openings between rail ends is an indication of poor or inadequate anchorage and may set up points where buckling will occur when opportunity arises. Where casual inspection of the track shows unequal expansion at the joints, especially where the disparity of the openings is pronounced, action should be taken to relieve the situation, since it is a sure indication of trouble to come.

Tracks with insufficient ballast in the cribs do not provide sufficient holding power for the ties against which anti-creepers are placed. Prevention of creepage depends upon these anchors and, through them, on the ties and the ballast. If, therefore, the ballast is insufficient in amount or of low quality, the resistance to creepage will be reduced correspondingly. From the foregoing, one draws the logical conclusion that double-shoulder tie plates do retard buckling of the track by adding an element which makes it stronger, more rigid and more resistant to the forces that tend to force it out of line. Of themselves, however, they can scarcely be expected to prevent buckling.

Coating the Interior of Tanks

What are the advantages and disadvantages of coating the interior of steel water tanks? How can this be done? What kind of coating should be used? Why?

Not Many Have Merit

By J. P. Hanley
Water Service Inspector, Illinois Central, Chicago

In former years, the coatings applied to the interiors of steel water tanks usually consisted of one shop coat and one field coat of red lead in linseed oil, which were covered in turn by one or more coats of a supposedly water-resistant paint. In some cases, the latter had an attractive trade or proprietary name that was intended to advertise it from a sales as well as from a utility standpoint.

More recently, several grease compounds produced by various manufacturers have appeared on the market and have been used to some extent for coating the interiors of water tanks. The grease in these compounds is a lubricant and it also acts as a carrier for a corrosion inhibitor. These compounds have merit as rust retarders but they have limited wearing surfaces, and they do not present as attractive or as finished an appearance as standard paints do. While this latter characteristic is no drawback and should not affect adversely their selection for use on the interior of a water tank, it is a factor for consideration in exterior work.

When the grease-compound coating is applied, the shop and field priming coats of red lead should be omitted, and the plates should be erected without surface treatment. After erection, the surfaces to be treated should be cleaned thoroughly by wire brushing and scraping, and the grease compound should be brushed in so that every part of the metal surface is covered with a thick but even film, which should be allowed to dry somewhat and attach itself to the metal before water is put into the tank.

It appears that a cement or a mastic coating might be developed for the interior of steel tanks where special conditions warrant this treatment. However, coatings of this kind have not been used by the railways up to the present.

The writer has inspected the interior of several steel tanks coated with red lead and standard paints, and has also inspected similar tanks coated with grease compounds but has been unable to detect any marked advantages in either coating. In each case failure of the coating was first noticed in small blisters or air pockets between the coating and the metal, and when the blisters were scraped down to the metal, it was found that the latter had started to oxidize. As the water conditions at the points inspected were not particularly corrosive, no immediate action was required, and the tanks were budgeted for recoating at a suitable time.

Under usual conditions the active pitting of steel tanks in railway water service is not serious and no special coatings are required, that is, nothing more than standard paints or rust-inhibiting grease compounds are needed. For tanks receiving return water, or those that serve under other corrosive conditions, special coatings may be used, but it is my observation that they would not be effective in preventing the wasting of the metal. It might be better and cheaper in the long run to treat the water to neutralize the corrosive elements than to try to keep them out of contact with the metal.

To Prevent Corrosion

By K. J. Weir
Special Water Inspector, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Obviously, the primary purpose of painting the inside of a steel water tank, or any other steel surface, is to provide protection against corrosion. Tank interiors are subject to constant contact with water or to alternate exposure to air and water, depending on the variations in tank-water levels. Surfaces exposed to air continuously, above the high-water level, usually are affected most seriously, the areas covered by fluctuating water levels develop less corrosion, while those portions of the tank shell that are submerged continuously are generally the least troublesome. Properly-cleaned steel surfaces and correctly-applied paint will reduce the corrosion hazard.

Water supplies vary in quality and affect steel accordingly. Some waters provide a certain degree of natural protection against corrosion for steel, and when such waters are stored in steel tanks the necessity for inside paint coatings is questionable. The variable quality of waters also affects paint coatings in many ways and it is sometimes with extreme difficulty and expense that the proper protective coating can be found. The chief disadvantages of coating tank interiors are the expense of periodical painting and the necessity for taking the tank out of service.

Selection of the proper tank coating is a highly controversial subject. Tests conducted over a period of years, using many different types of paints, seem to have developed the fact that no specific paint is suitable under all

conditions. Red lead, bitumastic coatings and certain synthetic-resin paints develop good results in many cases. Cathodic protection as a substitute for painting has developed rapidly during the last few years, but it is not entirely successful in preventing corrosion in every case. Again, new plastic preparations are being produced, which give some promise of interesting developments as protective coatings for steel. The use of steel plates 1/16 in. thicker than normally used in general practice adds only slightly to the cost of the completed new structure, but it does add to its life.

Oiling Joint Bars in the Track

What are the advantages of oiling joint bars in the track? Are they sufficient to warrant the cost? How should the oil be applied? When?

Retards Corrosion

By C. L. Fero
Supervisor of Work Equipment, Boston & Maine, Boston, Mass.

Among the advantages of oiling joint bars in the track, which obviously includes the oiling of the joint bolts as well, are (1) retardation of corrosion; and (2) when an asphaltic base oil, heated to 160 to 180 deg. F, is used, the oil will work around the nuts and seal the thread against water and grime, preventing the freezing of the nuts to the bolts, thus assuring ease of tightening and removal.

Joints can be oiled for about $0.005 each with an automatic oiling machine, and the track fastenings can be protected similarly for from $4 to $5 a mile, depending on traffic conditions and the cost of the oil, if applied by a well-designed track oiling machine. It is my observation that the advantages of oiling either the joints alone or the joints, the rail and the fastenings, are more than sufficient to warrant the cost of doing the work.

Prevents Frozen Joints

By P. J. Datesman
Roadmaster, Chicago & North Western, Council Bluffs, Iowa

There are many benefits to be derived from the oiling of joint bars in the track. The primary benefit is that the practice permits the rail to move in the joint as it expands and contracts under changes in temperature. The oiling process also tends to keep the bolts in good condition so that they can be adjusted, and thus it eliminates frozen joints.

Neither line nor gage can be maintained to the standards demanded today unless expansion is distributed evenly. Uneven expansion caused by frozen joints can result in sun kinks in hot weather and many broken bolts and joints that pull apart during cold weather. Compared with the many benefits that are derived from the application of oil to rail joints, the cost of making the application is surprisingly small. Joints can be oiled thoroughly for approximately three cents each, which includes the cost of both labor and material, if done by the section forces.

Rail joints should be oiled twice a year, late in the spring and again late in the fall. Done at these times, the joints will be prepared and in workable condition for the natural changes in temperature that follow these seasons. There are two methods of application. A regular rail or joint-oiling machine can be employed, or the oil can be applied by the section forces equipped with small garden sprayers. Whichever method is followed, the joint bars should be covered thoroughly with oil, on both the inside and outside surfaces.

Reducing the Fire Hazard

What precautions should be observed to reduce the fire hazard in creosoted pile and timber trestles?

Ballast Decks Reduce Risk

By F. H. Cramer
Bridge Engineer, Chicago, Burlington & Quincy, Chicago

Preservative treatment of wood brought about changes in the design of pile and timber trestles. By careful surveys, by advance planning and by the preframing of the timber, some of the fire hazards are eliminated, although the hazard of fire is always present in timber whether it is treated or untreated. With the knowledge that creosoted timber is combustible and that loss of a creosoted structure is greater than that of an untreated one, it is important that it be built to reduce the fire hazard as much as practical. Fires in trestles usually are started by sparks falling from locomotives. The ballast deck is, therefore, one of the best preventives of fires.

If open decks are used, some protective covering should be employed. A galvanized sheet-metal covering with well-designed fastenings reduces the fire risk materially. It is quite important to keep the ground beneath and at the ends of all trestles cleaned of vegetation for a distance of 15 ft. from the nearest timber. It is equally important that bird's nests and other waste and inflammable materials be kept away from the structure. It is advisable to have water barrels at each end and at intervals on long trestles. On very long structures, fire stops should be placed to check the spread of fire, of which several designs from concrete walls to asbestos boards, are available.

Keep Power Wires Away

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Many fire hazards in creosoted trestles can be eliminated by frequent and close inspection by the section and bridge forces as they pass over the structures and removal of all inflammable material, which accumulates almost constantly on open decks. The openings between ties will hold almost everything that drops from cars and other equipment, such as paper and oily waste, while grass, weeds and leaves are blown in from fields and forests. It needs then only a hot cinder from the locomotive or burning oil or waste from a hot box to start a good-sized fire. Sparks sometimes blow in from burning fields. Ballast decks and sheet-metal protection for open decks will reduce or eliminate the hazard from these sources. However, the ground around all trestles should be kept clean of vegetation. It is a matter of record that most of the fires in ballast decks originate from ground fires.

I am in favor of eliminating spacer blocks between stringers in creosoted open-deck trestles, drawing the

stringers tight together instead of spacing them. This will prevent the building of birds' nests, and will retard the spread of fire. I recall a fire that started approximately in the center of an 1,800-ft. trestle and spread to both ends in 45 minutes, the rapidity of its spread being largely the result of the spacing of the stringers. It is of the utmost importance to prohibit the attachment of high-voltage wires to any trestle.

Protect With Metal

By Julius M. Bischoff
Office Engineer, Terminal Railroad Association, St. Louis, Mo.

All open-deck pile and timber trestles should be protected with metal shields on the tops and sides of all caps and stringers. Tower bracing should have metal shields on the tops of the timbers, which extend downward at an angle to protect the sides near the tops. The top of the ties should be sheathed with 1-in. plank which is covered with asphalt mastic, upon which ½-in. stone or gravel is placed to a depth of 2 or 3 in.

Water barrels should be installed and kept filled with water, to which an anti-freeze substance should be added on the approach of cold weather. All weeds and grass in the vicinity of the pile or timber bents should be removed, and the ground should be plowed or spaded and then impregnated with salt or an anti-weed solution.

Where feasible, especially if the trestle is long or high, or both, it is advisable to install a water line and fire hydrants parallel to the trestle. It should be kept far enough away, however, so that fire fighters can use the hydrants without suffering from the heat of the burning trestle.

When to Renew Rail

What factors determine the necessity for renewing rail? What weight should be given to each? Are other considerations involved?

Many Factors Involved

By C. W. Baldridge
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

Naturally, one's first thought in considering the factors that determine the necessity for renewing rail is that this should be done when the rail is worn out. On second thought, however, the question arises as to what constitutes worn-out rail. Sometimes stretches of rail that have developed only a little wear require renewal because an excessive number of the rails are failing. In other cases, increases in the weights of cars and locomotives, in others higher train speeds, or it may be a combination of these factors, subject the rail to greater loads than the section and weight can be depended on to carry with safety. Again, there are cases when the need for rail for secondary tracks or branch lines becomes so urgent that it is advisable to lay new rail on important tracks for the purpose of releasing the rail in these tracks for use in the secondary tracks, thus providing improvement for both the main-line tracks and the secondary tracks at a lower cost than this can be done in other ways.

In still other cases, the condition of the ties, of the ballast, or of both, makes it so urgently necessary that roadbed conditions be improved by resurfacing the track, that it becomes economical to relay that part of the line so involved a year or two earlier than would be done otherwise. This will avoid excessive maintenance costs pending the renewal of the rail, or a duplication of the work if tie renewals, resurfacing and perhaps reballasting, are done separately from the rail renewals.

In addition, preparation for the use of heavier locomotives or for higher speeds sometimes justifies the earlier renewal of rail than would have otherwise been considered necessary. In such cases, the rail that is to be released will be in better condition and more valuable for reuse in other tracks than if it had been allowed to complete its useful life in primary service, and this will usually effect a real economy.

Assuming, however, that the need for released rail, and the condition of the ties, ballast and roadbed are normal, then the necessity for renewing the rail will depend solely upon its condition. Before the practice of building up rail ends by welding was developed, almost all rail renewals were based on the amount of batter at the rail ends. At present, rail renewals are usually based upon several factors, including frequency of failures, kinked and bent rails, wear spots on the face or gage edge of the rails, driver burns, abrasive wear of the base of the rails on the tie-plate bearings, end batter, wear on the fishing surfaces and rebattering of the ends until further welding becomes of questionable economy.

What weight should be given to each of these factors? The fact that rails which show almost no surface wear or wear spots are sometimes, of necessity, removed from the track out of face, because of the large number of failures, or of conditions that portend early failures, indicates that frequency of rail failures is of the most weight in determining when rail should be renewed. However, most out-of-face rail renewals are made as a result of the sum of the various kinds of wear conditions, and of defects in the metal, the need for new ties, for resurfacing, for released rail for use elsewhere and because of the wear factors that have been mentioned. The factor that is the most important and turns the scale in one place may be of minor consequence in another.

In a stretch of road that has a large percentage of curved track, it is not uncommon to renew the rail out of face when curve wear has reached the point that the rail on the curves needs renewal. In this case, the rail released from tangents can be used for repairs in other tracks of the same class, laid with the same section of rail. One very important consideration in determining rail renewals is that of finances; in other words, whether the company can spare the money necessary to buy the steel and install it. At present, another important factor is that of ability to get the rail in the face of priorities.

Boils Down to Three

By J. M. Farrin
Special Engineer, Illinois Central, Chicago

This has been a live question among railway engineers for years, but because of differing local physical conditions, traffic densities, character of traffic and train speeds, the question has elicited many answers, each of which many have been correct for the particular location involved. However, a number of different, and sometimes conflicting, answers to the same question is confusing, for which reason, to arrive at a logical conclusion, it becomes necessary to formulate the fundamentals governing rail use, and these boil down to safety, cost of maintenance of rail and equipment and riding comfort.

Of these fundamentals, safety is by far the most important and demands expert analysis on the part of

the engineer in determining whether the renewal shall be made. In considering this factor, it must not be overlooked that a worn rail does not possess the same stiffness as a new rail of the same section, by reason of which unit stresses may be increased as much as 10 per cent. In general, computed unit stresses in rail should not be greater than 32,500 lb. per sq. in., since it has been found that when this normal maximum is exceeded, unusual loads caused by swaying equipment, flat spots in the rail, and low spots in the track will raise the stress to abnormal and dangerous levels. It has been discovered recently that driver burns or other indentations in the rail may be incipient causes of internal fissures. If such defects are prevalent, the rail either should be renewed or a smooth surface restored by welding, the remedy being determined by economics and the judgment of the engineer.

As the rail becomes older, not only the cost of maintaining the rail itself, but also of maintaining the entire track structure and the equipment passing over it, increases as a result of additional impact, and in this case the question of renewal becomes a matter of simple economics. On the other hand, riding comfort is a factor to be considered principally from the importance of the district involved as a passenger-carrying line and of the speed that must be maintained.

Riding comfort is generally affected by surface defects in the rail, such as corrugations, driver burns, general line and surface kinks, joint conditions, and by low spots in the track. The effect on riding comfort of each one of these defects will vary approximately as the square of the speed. The resultant effect on the question of renewing the rail must rest with the engineer in charge.

It is evident from the foregoing discussion that the traffic age of the rail, together with its ability to carry its load safely, plays an important part in its renewal. That some idea may be given of the tonnage or traffic life of different sections of rail, it is suggested that when the freight and passenger traffic, including locomotives, reaches 200,000,000 tons for 90-lb. rail; 250,000,000 tons for 100-lb rail; 325,000,000 tons for 112-lb. rail; 400,000,000 tons for 131-lb. rail, and 550,000,000 tons for 152-lb. rail, all of which have been properly built up as occasion demanded, the question of renewing the rail be investigated thoroughly and scientifically.

Based on the foregoing principles, the weights that should be given to the several factors that determine when renewals should be made, will be in the following order:

1. Safety is paramount and no compromise affecting safety should be permitted.
2. Cost of maintenance, generally, should rank second, except when riding comfort is a controlling revenue factor.
3. Riding comfort ranks third, except as noted previously in connection with cost of maintenance.

How Long Between Surfacings?

Where track is surfaced out of face periodically, what method of maintenance between periodic surfacings will give best results? Why? Does the kind of ballast or the character of the traffic make any difference?

There Is No Standard

By J. P. Datesman
Roadmaster, Chicago & North Western, Council Bluffs, Iowa

No standard has ever been established for the maintenance of track between periodic out-of-face surfacings. Every roadmaster has his own ideas about how this work should be carried out. Every man connected with track maintenance knows that a considerable amount of work must be done by the section forces, after the track has been surfaced out of face. My experience indicates that it takes about two years to get the track in proper surface, line and gage after it has been raised out of face. We all know that a large gang is required to work fast; consequently there is always settlement because of uneven tamping.

This settlement must be corrected by the section forces and I believe that spot surfacing, with the roadmaster locating the rough spots by riding trains, is the most successful. A large number of rough spots will be caused by variations that have been left in gage and line. Surfacing gangs generally renew a considerable number of ties, and the settlement of the tie plates into the new ties will cause variations in gage, while many of the rough spots resulting from uneven tamping will cause the track to go out of line if they are not repaired promptly.

When a track has been properly conditioned after an out-of-face surfacing, it is my belief that the spot-surfacing method should be continued, to keep the track in smooth-riding condition. By following this system, the only portion of the roadbed that is disturbed is that which goes out of level, line or gage. It will be found that the spots that require continual maintenance are well known to the local section foreman, as they are caused by water pockets, soft spots in the subgrade or by poor drainage. Traffic conditions do not enter into this method of maintaining track, for all classes of track, with either heavy or light traffic, can be maintained in this manner.

It has been my experience that all kinds of ballast can be spot tamped, although it is easier to do spot tamping in cinders or gravel. Spot surfacing should not be left to the judgment of the section foreman, because he does not know which spots are riding rough. Many sections of track that are out of level, but uniformly so, do not affect the riding qualities, but a section foreman has no way of knowing this. For this reason, he may spend considerable time making repairs at a point that is riding smoothly and neglect other spots that are not. The roadmaster should locate these spots by tieing them in to some fixed object, such as bridges, crossings, switches or mile posts. The surest way of doing this is by counting the number of telegraph poles between the fixed object and the rough spot.

If this method is followed, a section foreman does not have to hunt for the places that need repairs. My experience has proved to my own satisfaction that it is possible for a small section gang to repair from two to five rough spots a day, when they are correctly located for the foreman.

Depends on Many Factors

By T. M. Pittman
Division Engineer, Illinois Central, Waterloo, Iowa

The best method of maintaining track between periodic surfacings will depend on a number of factors, among which are the character of the ballast; the condition of the rail, particularly at the ends; the stability of the subgrade; the length of the interval between periodic surfacings; the degree of care exercised in the previous surfacing; and the extent of the tie renewals that are necessary. In general, the whole question resolves itself into maintaining a smooth-riding condition

which, for a while after the track has been surfaced, becomes a matter only of picking up an occasional low joint.

Later it will become necessary to level the rails for short distances and, after a year or two, to replace some of the ties. The number of ties to be renewed will depend on the length of the interval between surfacings and the extent to which the ties were renewed when the track was surfaced. In some cases this interval will be only three or four years and all of the ties that will not last until the next surfacing will have been removed, those still serviceable being reused in secondary tracks or branch lines.

This method has more merit where the traffic is very heavy and the ballast is coarse, which makes the intermediate smoothing and tie renewals expensive. Where traffic is light and the ballast is finer, it will be more economical to lengthen the interval between surfacings and leave in the track all ties that will last as long or longer than two years. This method will require the renewal of more scattered ties between surfacings, but will produce greater economy in the use of ties, and in the cost of maintenance. In the final analysis, the question must be determined for every case after full consideration of the several factors that have been enumerated.

Following Surfacing Gang

By J. L. Monk
Section Foreman, Southern Pacific, Gonzales, Cal.

When track is surfaced periodically, I have obtained best results from following about two days behind the surfacing gang to pick up the weak places that always develop after track has been given a raise. It is almost invariably necessary also to touch up the line where the track must be surfaced. It is an excellent idea to go over the whole section again about a week later to smooth both line and surface where further uneven settlement has occurred. This will assure nearly uniform settlement and result in smooth line as well as surface and, therefore, comfortable riding.

Generally, the kind of ballast will affect only the time interval of the immediate follow-up work. Stone ballast rarely settles as quickly as the finer materials, and it does not settle as uniformly. Slag, chatts, gravel, etc., settle quickly but are more likely to hold the surface and generally require less back spotting. If a good quality of ballast has been applied in making the out-of-face raise, and the original surfacing has been done properly, all that will be necessary until the next periodic surfacing will be spot work, with such additional work as will be involved in the renewal of ties as required.

Maintain Track Well

By W. Woolsey
Section Foreman, Illinois Central, Chicago

While surfacing and lining are of the highest importance, both immediately behind the surfacing gang, as well as all through the interval until the next out-of-face raise, no feature of track maintenance can be neglected safely. Any out-of-face work should be followed up by a gang to smooth the surface. If the raise has been 6 in. or more, either an augmented section gang or a special pick-up gang should follow about two days behind the surfacing, and this should be repeated a week or ten days later. This gang should pick up all weak spots and watch the line carefully at all points, correcting any irregularities that may have developed.

If the work has been done originally as it should have been done, the first two years will require only routine spot surfacing. In addition, however, special attention must be given to gage, which may develop many irregularities if the tie plates are of a design that requires some time for seating. Early attention to this item and to line will make life easier for the section foreman during the interval until the next surfacing. All other items of track work must then be maintained to the standard demanded by the class of track involved.

Painting in Hot Weather

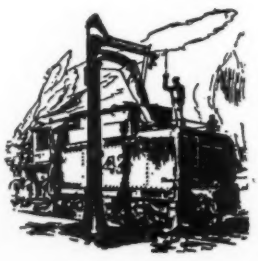
What special precautions, if any, are necessary when painting exterior wood surfaces during hot, dry weather?

Apply on Shady Side

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

During hot, dry weather, paint should be applied to exterior surfaces on the shady side of the building when this is possible. The paint must be thinned, however. Ordinarily, about one-third of the volume of the linseed oil already in the paint should be added and, if the mixture is gummy, about one quart of turpentine to the gallon should be added. The paint so prepared will flow freely and work well and fast. The added linseed oil will prevent the dry, highly absorptive wood surface from robbing the paint of too much of its vehicle and will thus protect the pigment from chalking.

Where undue delay will be caused by painting shady surfaces only, spray painting should be resorted to. If care is exercised in selecting both the compressor unit and the spray guns, and if the paint is mixed properly, no serious difficulty should be encountered in applying the paint by this method in the sun or in the shade.



Not While Exposed to Sun

By O. G. Wilbur
Field Engineer, Baltimore & Ohio, Baltimore, Md.

In painting exterior wood surfaces during hot, dry weather, special care should be taken not to paint surfaces that are hot because they have been exposed directly to the sun. On such surfaces the hot wood will absorb the paint vehicle so rapidly that the pigment will dust, flake or scale from the surface. If care is exercised not to apply paint under these conditions, there is no reason why painting done in hot weather should not have the same durability as that done in cool weather.

Paint applied during hot weather is likely to have its appearance marred by small insects sticking to it. It must be recognized further that the efficiency of labor is not as great when temperatures are high as when they are comfortable. Under no circumstances should paint be applied to wood surfaces when they are damp, as the moisture in the wood will cause the paint to blister. Surfaces to be painted in hot weather should, therefore, be thoroughly dry before paint is applied to them.

What Our Readers Think

Roadmaster Holds Key to Accident Prevention

Antigo, Wis.

To The Editor:

It is with great interest that I read the various articles presented in your magazine dealing with accidents and accident prevention. During the years that I have been employed in the roadmasters' office here, I have taken an active interest in accident prevention work, and while we have made substantial improvements, the fact remains that we still have too many accidents in our department.

I issue a weekly "Safety Letter" to our foremen, and believe that this helps, to some extent, at least, to keep before the men the necessity for constant caution and close supervision on their part to eliminate accidents on their sections. However, to be still more effective, this matter of accident prevention must be brought home to the men more forcefully.

I believe that the roadmaster can do a lot in this regard. However, to merely tell foremen that they must be careful and see that their men work safely is not enough. The roadmaster must see to it personally that the work is being done in the safe, approved manner at all times. In other words, to reduce accidents and personal injuries in the track department further, I believe the roadmaster must make this a personal, on-the-ground matter, and that there must be no let-up on his part.

Far too many of our foremen still cling to the idea that, in track work, accidents can be expected. As long as this idea remains in the minds of section foremen, no amount of letter writing will help much in preventing accidents. Here is where the roadmaster comes in. He can explode this idea that we must have accidents and will always have them. He can do this by merely referring to past accidents, pointing out how and why they happened.

I do not believe that there is a single section foreman working today who would not like to avoid accidents on his section. All of them know how unpleasant it is to make the necessary reports, and none of them wishes to be subjected to the usual investigation. Therefore, I believe we still have accidents in the track department largely because supervisory officers do not take enough time or trouble to educate their foremen properly in the true doctrine of accident prevention. It is generally accepted that you cannot expect to have accident-free section gangs if you have careless foremen. My point is that it is equally true that you cannot expect to have safe foremen if you have roadmasters who are more or less disinterested in accident prevention. The roadmaster must exhibit an active interest in the welfare of his foremen and laborers, and must instill in his foremen an earnest desire to avoid accidents. The foreman, in turn, must interest himself in the welfare of the members of his gang. In other words, every man in the track department has an important part to play, and all must work together to make accident prevention truly effective.

I realize that roadmasters have their hands full covering their territories; that they are busy getting the necessary work done. But to use this as an excuse for giving inadequate attention to personal safety work is to forget or to fail to concede that it is possible to get the work done, and at the same time get it done well and safely. A good job cannot be done at the cost of an accident; good work and safety go hand in hand.

While safety has been of first consideration for a number of years, it is more important today than ever before. Today, more and more skilled railroad workers are going into military service and defense jobs. This means new and inexperienced men on the track, which, in turn, means that we must now, more than ever before, educate our foremen in safety. No one can do this better than the roadmaster.

Nels J. Larsen,
Roadmaster's Clerk,
Chicago & North Western

New Book

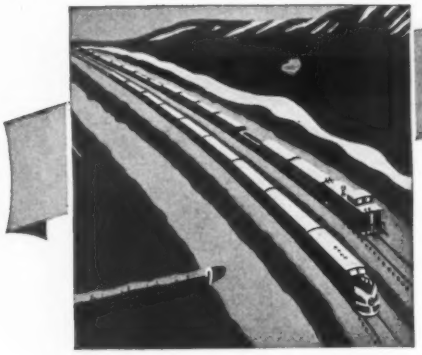
AREA Proceedings

PROCEEDINGS of the American Railway Engineering Association for 1942. 808 pages, 6 in. by 9 in. Bound in cloth and half Morocco. Published by the Association, 59 East Van Buren street, Chicago. Price, cloth $8, half Morocco, $9.

This volume contains the complete record of the year's work of this association, including the reports which its 25 standing and special committees presented at the forty-third annual convention at Chicago in March, together with the discussions which followed the presentation of these reports. It also includes addresses by Joseph B. Eastman, director, Office of Defense Transportation; by Andrew Stevenson, Chief, Transportation Equipment Branch, War Production Board; and by Dr. J. H. Cody, president, University of Toronto; each of which stressed the effect of the war on railway operation and maintenance.

As usual, the committee reports cover a wide range of subjects, providing valuable reference material on both railway maintenance and operation. Among the 126 subjects considered by the convention were specifications for portland cement, for concrete (tentative); for steel turntables; for welded steel tanks for water service; for lining tunnels with brick; for the design of rigid-frame steel bridges; for timber treating processes; for the treatment of Pacific Coast Douglas fir; for several kinds of pipe for culverts and subdrainage; for wood fense posts; for high-carbon steel track spikes; and for the prevention of erosion in natural waterways.

Valuable information is also given on freight-train resistance under various conditions of loading and speed; on the warehouse requirements for handling quick-frozen products; on communication at hump classification yards; on the modernization of passenger terminals; on the college man in railway service; on the problem of lubricating roadway machines; and on new developments in roadway machines. There are numerous studies of track and rail, and the Eighth Progress report of the Joint Investigation of Fissures in Railroad Rails is included in the report on rail. The volume also includes a monograph on the Influence of the Fatigue Strength of Structural Members upon the Design of Steel Bridges, by W. M. Wilson, research professor of structural engineering, University of Illinois. Valuable information is also contained in the statistical data for the previous year on rail failures and crosstie renewals and service records.



NEWS of the Month

Expenditures for M. of W. and S. Increase

Expenditures of the Class 1 railways for maintenance of way and structures in April, 1942, aggregated $62,369,169, the highest for any April since 1930, and compared with $45,461,554 in April, 1941, an increase of $16,907,615, or 37.2 per cent. During the first four months of 1942, maintenance of way and structures expenditures totaled $214,244,518, the highest for any like period since 1930, and an increase of $54,731,994, or 34.3 per cent, over the total in first four months of 1941.

Grade Crossing Accidents Delay War Traffic

Accidents at railroad-highway grade crossings are unnecessarily delaying the movement of war and other materials, as well as troops and other passengers, at a time when every effort is being made by the railroads to expedite such traffic, according to a study just completed by the Safety Section of the Association of American Railroads. An average of 38 trains a day, or 1,137 trains a month, are delayed a total of 22 hours a day, or 660 hours a month, from this cause. Of the average number of trains delayed each month, 702 are freight and 435 are passenger trains. The delay to freight trains alone averages 460 hours while delays to passenger trains amounts to 200 hours monthly, due largely to lack of proper care by motorists in approaching and passing over railroad-highway grade crossings.

Eighty-two per cent of the accidents take place at crossings having special protection, consisting of not only the standard sign that warns motorists that they are approaching a grade crossing, but also some special device such as flashing lights, gates or watchmen.

Railroad's "Luxury Service" to Be Curtailed

To help meet the emergency arising from restriction on the use of rubber and gasoline, the railroads will discontinue, for the duration, the operation of "luxury" cars where to do so will add to actual passenger-carrying capacity of trains, and will discontinue special train services to sports events and conventions, John J. Pelley, president of the Association of American Railroads, announced after a special meeting of that association in Chicago on May 29. Changes in passenger service began to go into effect on June 15.

To increase carrying capacity of the trains still further, the railroads will include day coaches in the consist of all trains where practicable, will not operate special trains for travel classified as non-essential to the war effort, and will not solicit convention travel.

"It was agreed further that for the duration of the war railroads will not advertise to solicit travel by train. This does not contemplate any reduction of advertising by railroads. In fact, it may be that they will increase their efforts to inform the public as to what the railroads are doing to help meet vital war needs for transportation, and how the public may best co-operate in that effort."

Tank Car Movement Soars to 731,520 Barrels

The tank car movement of oil into the East Coast area, soared to a new record average of 731,520 barrels daily during the week ended June 13. In handling the movement, 29 oil companies loaded 24,384 cars. Including cars that were on the way back west for reloading, it is estimated that the east coast service employed 56,000 cars.

I.C.C. Prescribes Mandatory Depreciation Accounting

Orders prescribing mandatory depreciation accounting, effective January 1, 1943, for roadway property, except track items such as rails, ties, ballast, and other track materials, have been issued by the Interstate Commerce Commission. The orders modify the rules covering optional depreciating accounting for road property in such a way as to substitute the group plan for the unit plan of accruals. In this order, strictly track items, including road and equipment primary accounts (8—Ties, 9—Rails, and 10—Other Track Material), are eliminated from the list of "depreciable" accounts, which accords with the position taken on that phase of the depreciation matter by the Association of American Railroads' Board of Directors, which last fall instructed the A.A.R. Accounting division to negotiate with the Commission to that end.

The list of accounts included in the mandatory order is as follows: 5—Tunnels and subways; 6—Bridges, trestles and culverts; 7—Elevated structures; 13—Fences, snowsheds, and signs; 16—Station and office buildings; 17—Roadway buildings; 18—Water stations; 19—Fuel stations; 20—Shops and enginehouses; 21—Grain elevators; 22—Storage warehouses; 23—Wharves and docks; 24—Coal and ore wharves; 27—Signals and interlockers; 29—Power plants; 31—Power transmission systems; 35—Miscellaneous structures; 37—Roadway machines; 44—Shop machinery; 45—Power plant machinery.

Under the prescribed rules, the charges for currently accruing depreciation are to be computed in conformity with the group plan by applying to the original cost or estimated original cost of the road property as found by the Commission's Bureau of Valuation such percentage rates "as will distribute the service value by the straight-line method in equal annual charges to operating expenses or other accounts during the estimated life of the property." As soon as the information can be assembled, each carrier is to submit its proposed annual rates; but until such time as those rates have been computed, the carrier must base its depreciation charges upon the percentage rates obtained from the Bureau of Valuation, "which is prepared to furnish such rates upon request."

Priorities and Prices

The following are references to recent orders of interest to railroad engineering and maintenance of way and structures men issued by the War Production Board and the Office of Price Administration.

Off-rail machines—Amendment No. 1 to Limitation Order L-53, issued June 15, prohibits any person from selling, leasing, delivering or transferring any new track-laying tractor or new auxiliary equipment, regardless of any preference rating, except upon a specific release issued prior to June 15, or upon specific authorization. The amendment does not prevent a dealer or any other persons from delivering or accepting delivery of auxiliary equipment to be mounted on a specific track-laying tractor in the possession of an ultimate consumer. The amendment gives WPB's Construction Machinery Branch greater control over the distribution of heavy type tractors by prohibiting producers from shipping to dealers and by requiring a release in connection with all rated orders, regardless of their date of issuance. Heretofore, no restrictions were placed on orders bearing an A-2 or higher rating issued prior to February.

Railroad materials—Amendment No. 1 to P-88, issued June 18, raises to A-1-j the rating available to the railroads for deliveries of materials essential for the repair and maintenance of tracks, structures, signal and communications systems, cars and locomotives, and other important operating equipment. Previously, an A-3 rating was available for deliveries of these materials. The amendment also specifies that ratings under the order may be applied without further authority for installations in which the charge to capital account is not in excess of $500 for a single project. The amendment prohibits the application of a higher rating than A-1-j by suppliers to replenish inventories depleted as a result of deliveries made on A-1-a orders for emergency repairs. Other minor changes include a provision that railroads may not only sell material to their own subsidiaries but also to lines not owned but customarily maintained by them.

Personal Mention

General

J. F. Cooper, roadmaster on the Canadian National at Brandon, Man., has been promoted to assistant superintendent, with the same headquarters.

E. W. G. Chapman, division engineer on the Canadian National at Edmundston, N. B., has been appointed acting superintendent of the Edmundston division, with the same headquarters.

Frederic R. Bartles, assistant general manager of the Northern Pacific Lines west of Livingston, Mont., and an engineer by training and experience, has been promoted to general manager of the Lines west, with headquarters as before at Seattle, Wash.

Dane R. Waite, general bridge and building foreman of the Spokane International, with headquarters at Spokane, Wash., and an engineer by training and experience, has been promoted to superintendent, with the same headquarters. Mr. Waite was born at Menomonie, Wis., on January 7, 1880, and served in the Spanish-American War. He entered railway service in 1906 in the engineering department of the Great Northern at Seattle, Wash., and in 1912 went with the Northern Pacific in the engineering department at Tacoma, Wash. From 1914 to 1917, Mr. Waite worked for Porter Brothers, railroad contractors, in Washington and Oregon and on January 1, 1918, he went with the Spokane International as general bridge and building foreman.

Henry M. Shapleigh, trainmaster on the Great Northern at Great Falls, Mont., and an engineer by training and experience, has been promoted to superintendent of the Klamath division, with headquarters at Klamath Falls, Ore. Mr. Shapleigh was born at Moorehead, Minn., on February 17, 1902, and attended the University of Minnesota from October, 1920, to December, 1922. On December 10, 1922, he entered railway service as a chainman in the engineering department of the Central district of the Great Northern, later being promoted to rodman. On October 1, 1924, he was appointed assistant to the roadmaster at Whitefish, Mont., later being transferred to Everett, Wash., and on July 1, 1926, he was advanced to district roadmaster on the Butte division at Great Falls. Mr. Shapleigh was appointed trainmaster at Great Falls on April 16, 1929, and on August 20, 1931, he was reappointed district roadmaster at that point. On August 1, 1934, he was again appointed trainmaster at Great Falls, which position he held until his recent promotion, effective June 1.

William R. Devenish, general manager of the Western region of the Canadian National and an engineer by training and experience, has been promoted to vice-president and general manager of that region, with headquarters as before at Winnipeg, Man. Mr. Devenish was born in Ireland on November 21, 1882, and was educated at St. Columbus College and Trinity College, Dublin. After previous experience as an engineer in railway work, he engaged in construction activities with the Transcontinental Railway in 1912 and the following year become division engineer for the Intercolonial at Moncton, N. B. After holding supervisory

William R. Devenish

posts at Campbellton, N. B., and Moncton, he was later appointed successively general superintendent for the Canadian National at Toronto, Ont., North Bay, Ont., and Edmonton, Alta., and general superintendent of transportation for the Western region, with headquarters at Winnipeg. In October, 1939, he was advanced to general manager of the Western region.

Warren W. Kelly, general purchasing agent of the Atchison, Topeka & Santa Fe and an engineer by training and experience, has been appointed associate director of the Office of Defense Transportation's Section of Materials and Equipment. Mr. Kelly was born at Winfield, Kan., on November 30, 1885, and attended Washburn Academy at Topeka, Kan., and the Rose Polytechnic Institute at Terre Haute, Ind., graduating from the latter in 1907. He first entered railroad service as a chainman on the Santa Fe during the

Warren W. Kelly

summers of 1903 and 1906, and after graduation reentered the engineering service of the Santa Fe in September, 1907, as a chainman. Mr. Kelly subsequently served as a rodman, transitman, assistant engineer, pilot engineer, and chief pilot engineer. In 1917, he was promoted to division engineer at Winslow, Ariz., and in 1919, he was transferred to San Bernardino, Calif. In 1921, he was promoted to district engineer at Los Angeles, and in 1929 he became chief engineer of the Western lines, with headquarters at Amarillo, Tex. On July 1, 1938, Mr. Kelly became general purchasing agent for the Santa Fe system.

Horace C. Grout, assistant to the vice-president on the Canadian Pacific, with headquarters at Montreal, Que., and an engineer by training and experience, has been promoted to general manager of the Western lines, with headquarters at Winnipeg, Man. Mr. Grout was born at Wausau, Wis., on March 14, 1881, and attended Northwestern Military Academy and the University of Wisconsin. He entered railway service in 1898 with the Canadian Pacific as a rodman in the construction department, later being advanced to instrumentman and resident engineer. From 1904 to 1910 he served as resident engineer with the maintenance of way department and assistant division engineer at Toronto, Ont. He then served as assistant superintendent at Havelock, Ont., and Toronto and as superintendent successively

Horace C. Grout

at Toronto and Brownville Junction, Me. In October, 1912, he became assistant general superintendent of the New Brunswick district at St. John, N. B., later becoming general superintendent of this district. He was transferred to the Ontario district at Toronto in April, 1920, and in September, 1934, he was promoted to assistant to the vice-president at Montreal.

Carl H. Burgess, assistant superintendent on the Northern Pacific at Tacoma, Wash., and an engineer by training and experience, has been promoted to superintendent, with the same headquarters. Mr. Burgess was born at Worcester, Mass., on February 17, 1894, and studied civil engineering at Worcester Polytechnic Institute from 1912 to 1916. He entered railway service on June 19, 1916, as a clerk in the track department of the Northern Pacific at Billings, Mont., and on January 19, 1917, he was transferred to the engineering department as a rodman at Livingston, Mont., later serving as a draftsman and assistant engineer at that

point. On April 23, 1923, Mr. Burgess was appointed assistant roadmaster at Livingston and in January, 1925, he was advanced to roadmaster at Fargo, N. D., later being transferred to Glendive, Mont. In April, 1929, he was promoted to division roadmaster at Jamestown, N. D., and in January, 1932, he was transferred to Missoula, Mont. Mr. Burgess was appointed trainmaster-roadmaster at Missoula in February, 1936, and five months later, he was appointed trainmaster at Pasco, Wash., later being transferred successively to Auburn, Wash., and Tacoma. In November, 1939, he was promoted to assistant superintendent at Tacoma, which position he held until his recent promotion, effective June 1.

Norman B. Pitcairn, co-receiver of the Wabash, and an engineer by training and experience, was elected president of the newly organized Wabash Railway Company on May 21. Mr. Pitcairn was born at Harrisburg, Pa., on November 8, 1881, and graduated in civil engineering from Princeton University in 1903. He entered railway service on June 29, 1901, as a rodman on the Pennsylvania and was promoted to transitman in 1904 and to assistant supervisor of track in 1905. Five years later he was further promoted to supervisor of track and on November 10, 1919, he was appointed division engineer on the Pittsburgh division, from which he was transferred to the Middle division in the following year, and then to the New York division in July, 1922. In October, 1923, Mr. Pitcairn was promoted to superintendent of the Erie and Ashtabula division and later served in the same capacity on the Middle and the New York divisions. In July, 1928, he became general superintendent of the Eastern Ohio division, which position he held until January, 1931, when he was elected president of the Detroit, Toledo & Ironton with headquarters at Dearborn, Mich. He resigned from this position on October 18, 1933, to become co-receiver of the Wabash.

Norman B. Pitcairn

Engineering

George F. Drummond, assistant architect of the Canadian National, has been appointed assistant chief architect, with headquarters at Montreal, Que.

J. Stewart, roadmaster on the Southern Pacific at Los Angeles, Cal., has been promoted to assistant division engineer at El Paso, Tex., succeeding **H. C. Stull.**

C. W. Baldridge, assistant engineer of the Atchison, Topeka & Santa Fe system, with headquarters at Chicago, retired on July 1.

J. M. Tilley, instrumentman on the Illinois Central at Champaign, Ill., has been promoted to assistant engineer at that point, succeeding **Harold C. Hayes,** whose death on June 12 is reported elsewhere in these columns.

A. J. Cullen, section foreman on the Canadian National at Brandon, Man., has been promoted to acting roadmaster at that point, succeeding **A. J. Marshall,** who has been transferred to the Cromer and Carlyle subdivision, with the same headquarters, relieving **J. F. Cooper,** whose promotion to assistant superintendent at Brandon is reported elsewhere in these columns.

Albert A. Colvin, engineer and supervisor of bridges and buildings on the Chicago & North Western at Mason City, Iowa, has been promoted to division engineer at Norfolk, Neb., succeeding **Donald C. Barrett,** who retired on July 1. **Leo C. Smith,** roadmaster at Green Bay, Wis., has been advanced to engineer and supervisor of bridges and buildings at Mason City, replacing Mr. Colvin.

Edward H. Lewis, supervisor of track on the Illinois Central at Jackson, Miss., has been promoted to division engineer of the Louisiana and New Orleans terminal and the Gulf and Ship Island division, with headquarters at McComb, Miss., succeeding **S. C. Jump,** who has been transferred to Clinton, Ill. Mr. Jump relieves **F. W. Armistead,** who has been assigned to other duties because of illness.

G. M. Magee, research engineer, Engineering division, Association of American Railroads, with headquarters at Chicago, has been, effective June 22, assigned temporarily to the staff of C. H. Buford, vice-president, Operations and Maintenance department, A. A. R., with headquarters at Washington, D. C. Mr. Magee will continue to supervise the research work of the Engineering division along with his special assignments in Washington.

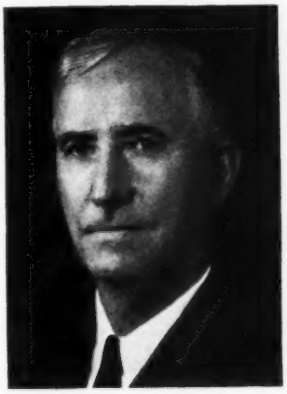
Luman M. Harsha, whose promotion to engineer-roadmaster of the St. Louis, San Francisco & Texas (Frisco lines in Texas), with headquarters at Ft. Worth, Tex., was reported in the May issue, was born at Shawneetown, Ill., on July 9, 1890, and attended the University of Kansas from 1911 to 1914. He entered railway service on July 28, 1914, as a rodman on the Frisco at Springfield, Mo., later serving as transitman, draftsman and assistant engineer at that point. From July 26, 1918, to February 28, 1919, he served with the U. S. Army, and on March 1, 1919, he returned to the Frisco as a rail inspector, later being appointed transitman at Springfield. On March 1, 1920, Mr. Harsha was transferred to Enid, Okla., where he served as assistant engineer and transitman until October 16, 1926, when he was promoted to roadmaster at Hugo, Okla., later being transferred to Ft. Smith, Ark. On October 1, 1929, he was appointed assistant engineer at Sapulpa, Okla., later being transferred to Tulsa, Okla., and on May 1, 1933, he was appointed roadmaster at Oklahoma City, Okla., which position he held until his recent promotion, effective April 1.

Frank D. Kinnie, regional engineer of the Atchison, Topeka & Santa Fe, with headquarters at Los Angeles, Cal., has been promoted to chief engineer of the Eastern lines, with headquarters at Topeka, Kan., succeeding **Henry W. Wagner,** who retired from active service on July 1. Mr. Kinnie was born in Davidson county, Tenn., on July 8, 1886, and attended David Lipscomb college, Nashville, Tenn. He entered railway service on September 6, 1909, as a rodman on construction for the Santa Fe in Texas, later being appointed a building inspector. On July 1, 1912, he was promoted to transitman in charge of field surveys, later serving as an estimator and pilot engineer on valuation work. On November 3, 1917, he was advanced to assistant division engineer at Winslow, Ariz., and on November 21, 1921, he was promoted to assistant engineer in charge of maintenance of the San Francisco Terminal division. Mr. Kinnie was promoted to division engineer of the same division, with headquarters at San Francisco, Cal., on November 1, 1925, and on September 1, 1929, he was advanced to district engineer of the Coast lines, with headquarters at Los Angeles, Cal. In February, 1941, he was appointed regional engineer, with the same headquarters, and assigned to special duties in connection with national defense and industrial projects, which position he held until his recent promotion.

Frank D. Kinnie

Mr. Wagner was born at Boone, Iowa, on June 23, 1872, and graduated in civil engineering from the University of Kansas. He entered railway service in May, 1897, as a chainman in the maintenance department of the Santa Fe at Newton, Kan. In May, 1898, he was advanced to rodman and two months later he was promoted to transitman. In April, 1900, he went with the Union Pacific, serving successively as levelman, transitman and location engineer on location and construction work for that road and the Oregon Short Line (now part of the Union Pacific). He returned to the Santa Fe in

August, 1902, as a masonry inspector, later serving as assistant engineer at Arkansas City, Kan., and Marceline, Mo., and assistant engineer in charge of relocation and grade reduction work at Woodward,



Henry W. Wagner

Okla. In May, 1909, he was promoted to division engineer on construction at Amarillo, Tex., and in June, 1910, he was advanced to principal assistant engineer, maintenance of way, at that point. Mr. Wagner was promoted to district engineer, with headquarters at La Junta, Colo., in April, 1913, and in October, 1917, he was advanced to chief engineer of the Eastern lines.

Clarence L. Waterbury, assistant engineer on the Chicago, Milwaukee, St. Paul & Pacific at Chicago, has been promoted to division engineer of the Terre Haute division, with headquarters at Terre Haute, Ind., succeeding **T. M. Pajari,** who has been transferred to the Coast division, with headquarters at Tacoma, Wash. Mr. Pajari relieves **J. F. Pinson,** who has been transferred to the Seattle (Wash.) general office. **K. L. Clark,** assistant engineer on the Chicago Terminal division, has been promoted to assistant engineer in the general offices at Chicago, replacing Mr. Waterbury.

Mr. Waterbury was born at Urbana,

Clarence L. Waterbury

Ill., on June 9, 1906, and graduated in civil engineering from the University of Illinois in 1926. He then worked for the Illinois Division of Highways at Springfield, Ill., and in 1928 went with Greeley and Hansen, sanitary engineers, at Chicago. From 1935 to 1937 he served with the Portland Cement Association at Chicago and on June 15, 1937, entered railway service as an instrumentman on the Milwaukee at La Crosse, Wis. Mr. Waterbury was appointed assistant engineer, water service, at Chicago on May 1, 1939, and on December 1, 1940, he was appointed assistant engineer in the office of the chief engineer.

F. A. Roberts, whose promotion to assistant division engineer of the Marion division of the Erie, with headquarters at Huntington, Ind., was reported in the June issue, was born at Buffalo, N. Y., on July 18, 1905, and studied engineering through correspondence courses. He entered railway service on December 21, 1925, as a transitman on the Erie at Salamanca, N. Y., later serving as rodman and levelman at that point. On April 1, 1936, he was appointed assistant track foreman on the Meadville division and on November 1, 1936, he returned to Salamanca as a transitman. Mr. Roberts was promoted to chief of corps at Marion, Ohio, on August 1, 1939, and on April 1, 1941, he was appointed acting assistant division engineer at Youngstown, Ohio. Two months later, he returned to Marion as chief of corps, which position he held until his recent promotion, effective April 3.

W. C. Schakel, office engineer in the office of the district engineer on the New York Central (Big Four) at Cincinnati, Ohio, has been promoted to assistant division engineer at Bellefontaine, Ohio. **W. W. Rohrbough,** first assistant to the division engineer at Indianapolis, Ind., has been appointed office engineer at Cincinnati, succeeding Mr. Schakel, and **Thomas R. Clevenger** has been appointed first assistant to the division engineer at Indianapolis, relieving Mr. Rohrbough. **J. W. Vest,** supervisor of track on the Peoria & Eastern (subsidiary of the N. Y. C.) at Indianapolis, has been appointed assistant engineer on the Big Four at Springfield, Ohio, replacing **N. E. Manville,** who has been transferred to the P. & E. at Indianapolis, succeeding Mr. Clevenger. **Louis R. Jabinson,** assistant engineer on the Big Four at Indianapolis, has been transferred to the district engineer's office at Cincinnati.

William A. Duff, engineer of bridges and roadway of the Canadian National, with headquarters at Montreal, Que., retired on May 15, in accordance with the pension regulations of the company. **Ross O. Stewart,** assistant engineer at Montreal, has been appointed engineer of bridges at Montreal. **John A. Ellis,** assistant engineer of roadway standards at Montreal, has been appointed engineer of track at Montreal. Mr. Duff was born in Wentworth county, Ont., and was graduated from the University of Toronto in 1901 in Applied Science. He entered railroad service in 1901 with the Vancouver, Victoria & Eastern (Great Northern) as draftsman and engineer, becoming assistant engineer for the Grand Trunk at Hamilton, Ont., the following year. From 1903 to 1907 Mr. Duff served as draftsman with various bridge companies and from 1907 to 1913 he was chief draftsman and assistant bridge engineer for the Transcontinental (Canadian National) at Ottawa, Ont. In 1913 Mr. Duff became bridge engineer for the Canadian Government Railways (Canadian National) at Monc-

William A. Duff

ton, B. C., and in 1916 he became assistant chief engineer. In 1920 he became engineer of standards of the Canadian National, becoming engineer of bridges and roadway in 1932.

Mr. Stewart was born at Lindsay, Ont., and was graduated from the University of Toronto in Applied Science in 1910. He began his career in the engineering department of the Dominion Bridge Company and in 1913 he joined the Canadian Government Railways as assistant bridge engineer at Moncton, N. B. After the organization of the Canadian National, Mr. Stewart was appointed assistant engineer of standards, first at Toronto and then at Montreal. He subsequently served as engineer of bridge standards, assistant structural engineer and assistant engineer, holding the latter position at Montreal until his recent appointment.

Mr. Ellis was born at Arbroath, Scotland, and was graduated from the City and Guilds Technical College, London. He began his career as pupil assistant on construction on the Great Northern, Pica-

Ross O. Stewart

dilly & Brompton Tube railway, after which he was with the former Great Northern, now part of the London & North Eastern. Then followed a period

in India on construction and maintenance with the Oudh and Rohilkhund State railway. Mr. Ellis went to Canada in 1911 and joined the Canadian Northern (Canadian National) on construction and location. Three years were spent with the Canadian Pacific on location and construction and in 1915 Mr. Ellis was appointed engineer of construction with the Canadian Government Railways at Moncton, later becoming office engineer there. In 1921 Mr. Ellis was appointed assistant engineer of roadway standards for the Canadian National at Toronto, later being transferred to Montreal.

John A. Ellis

Track

C. M. Richardson has been appointed roadmaster on the Atchison, Topeka & Santa Fe at Marceline, Mo., succeeding **E. L. Banion,** who has been transferred to Topeka, Kan.

Frank F. Carter has been appointed roadmaster on the Missouri-Kansas-Texas, with headquarters at Smithville, Tex. **H. H. Evans** has been appointed roadmaster at Muskogee, Okla.

W. B. Jacobsen, track inspector on the Salt Lake division of the Denver & Rio Grande Western, has been promoted to roadmaster at Alamosa, Colo., succeeding **Thomas Eagen,** who retired from active service on June 16.

Elmer F. Saum, in the office of the division engineer of the New York Central at Cleveland, Ohio, has been appointed assistant supervisor of track, with the same headquarters, succeeding **George Chambers,** who retired on June 16.

C. J. Overholzer, assistant roadmaster on construction for the Chicago, Rock Island & Pacific, has been promoted to roadmaster at Little Rock, Ark., succeeding **S. T. Robertson,** whose promotion to engineer-roadmaster of the Burlington-Rock Island is reported elsewhere in these columns.

J. N. Fuller, office engineer in the division headquarters office of the Southern Pacific Lines in Texas and Louisiana at Austin, Tex., has been promoted to roadmaster, with the same headquarters, succeeding **F. G. Fisk,** who retired from active service on April 1. Mr. Fuller was born at Minneapolis, Minn., on November 7, 1899, and attended Rice Institute. During World I he served in the U. S. Army. He then entered railway service in June, 1919, with the Southern Pacific Lines in Texas and Louisiana and has been employed with that road since, for several years serving as office engineer at Austin.

John F. Foley, track supervisor on the south end of the St. Joseph division of the Chicago, Burlington & Quincy, has been promoted to roadmaster at St. Joseph, Mo., relieving **J. R. Caldwell,** who has been transferred to Cameron Junction, Mo. Mr. Caldwell succeeds **W. A. Bercaw,** who retired on July 1.

A. A. Stonecipher, track supervisor on the Southern at Huntingburg, Ind., has been transferred to Lawrenceburg, Ky, succeeding **F. G. Birkla,** who has been transferred to Huntingburg, with jurisdiction over branch lines, replacing **W. C. Johnson,** who, in turn, has been assigned the territory formerly under the jurisdiction of Mr. Stonecipher, with the same headquarters.

Fred G. Hull has been appointed supervisor of maintenance on the Canadian division of the Pere Marquette, succeeding **A. D. Derrough,** who has been promoted to trainmaster. **Harold Kellogg** has been appointed track supervisor in charge of the Port Austin division and the territory from Brown City, Mich., to Port Huron on the Port Huron division, succeeding **Samuel Neeley,** who retired on May 16.

T. B. Greer, instrumentman on the Illinois Central at McComb, Miss., has been promoted to supervisor of track at Jackson, Miss., succeeding **E. H. Lewis,** whose promotion to division engineer, with headquarters at McComb, Miss., is reported elsewhere in these columns. **H. J. Hawkins,** acting supervisor of track at Carbondale, Ill., has been advanced to supervisor of track, with the same headquarters.

Lonnie E. Snyder, track supervisor on the Chicago, Rock Island & Pacific at Iowa City, Iowa, has been promoted to roadmaster at Sibley, Iowa, succeeding **George R. Brum,** who has been transferred to El Dorado, Ark. Mr. Brum relieves **Alex Stamos,** who has been transferred to Bureau, Ill., replacing **A. O. Martin,** transferred to Iowa City.

Charles P. Willis, whose promotion to supervisor of track on the Pennsylvania, with headquarters at Kalamazoo, Mich., was reported in the June issue, was born at Erie, on March 6, 1898, and attended the University of Pittsburgh in 1916 and 1917 and Carnegie Institute of Technology night school from 1917 to 1920. He entered railway service on September 1, 1918, as a levelman in the Pennsylvania's engineering corps at Pittsburgh, Pa., and on October 1, 1919, he was appointed a draftsman. He then served as assistant supervisor of track at Monongahela City, Pa., rodman at Trafford, Pa., and assistant supervisor of track at Blairsville, Pa., and Gallitzin. On January 16, 1927, Mr. Willis was promoted to supervisor of track at Ravenna, Ohio, and he was transferred to Wellsville, Ohio, on February 1, 1928, to Johnstown, Pa., on November 12, 1928, and to Erie, Pa., on December 1, 1929. On June 16, 1940, he was appointed a draftsman at Erie, which position he held until his recent promotion, effective April 9.

J. O. Johnson has been appointed roadmaster on the Southern Pacific at Dunsmuir, Cal., succeeding **C. E. Neal,** who has been transferred to Niles, Cal., replacing **C. N. Myrick. J. J. Kennedy** has been appointed roadmaster at Suisun-Fairfield, Cal., relieving **A. Hallisey,** who has been transferred to Oakland Pier, Cal., succeeding **S. E. Gordon. L. R. McAllister,** bridge and building supervisor at Los Angeles, Cal., has been appointed acting roadmaster at Los Angeles, replacing **J. Stewart,** whose promotion to assistant division engineer at El Paso, Tex., is reported elsewhere in these columns. **D. E. Wisner** has been appointed roadmaster at Bowie, Ariz., relieving **M. T. Pruett,** who has been transferred to Tucson, Ariz., succeeding **R. H. Epperson. C. C. Bell** has been appointed roadmaster at Tucumcari, N.M., replacing **N. M. Wells,** who has been transferred to Douglas, Ariz., relieving **J. E. Johnston.**

M. C. Day, whose promotion to roadmaster on the Union Pacific, with headquarters at Valley, Neb., was reported in the May issue, was born at Dexter, Kan., on February 4, 1904, and entered railway service on July 2, 1928, as a section man at Kearney, Neb. From August 16, 1928 to July 15, 1937, he served as section and extra gang foreman at various locations on the Nebraska division and on the latter date he was promoted to roadmaster at Valley. On May 15, 1938, he was transferred to Cheyenne, Wyo., and on September 1, 1938, he was appointed section foreman at Cozad, which position he held until his recent promotion.

Robert H. Archer, whose promotion to roadmaster on the Union Pacific, with headquarters at Manhattan, Kan., was reported in the May issue, was born at Hallsville, Mo., on September 21, 1900, and entered railway service on February 10, 1920, as a timekeeper on the Nebraska division of the Union Pacific, later being transferred to the Western division. In 1923 he was promoted to section and extra gang foreman and in 1929 he returned to the Nebraska division. Mr. Archer was advanced to assistant roadmaster at Omaha in July, 1941, which position he held until his recent promotion.

Charles L. Towle, whose promotion to supervisor of track on the Pennsylvania-Reading Seashore Lines, with headquarters at Camden, N.J., was announced in the May issue, was born at Haddon Heights, N.J., on May 2, 1913. Mr. Towle graduated in civil engineering from Lehigh University in 1935, and entered railway service with the Pennsylvania on October 1, 1936, as an engineering apprentice, assigned to special duty. On April 1, 1937, he was advanced to rodman, and served in that capacity at various points until October 1, 1940, when he was promoted to assistant supervisor of track, with headquarters at New York. Mr. Towle was holding the latter position at the time of his recent promotion to supervisor of track.

R. R. Bonner, whose promotion to roadmaster on the Corpus Christi subdivision

(Continued on page 496)

Proving Its Mettle Saving Metal!

Today when the preservation of metal is a patriotic duty, RMC Plastic, more than ever before, is proving its mettle by

1 **Saving Steel:** It protects the most vulnerable spots of rails, the joints, from all corrosive agencies, increases rail life and practically eliminates parts-renewals.

2 **Saving Labor:** RMC Plastic reaches, protects and thoroughly lubricates every joint fastening and surface. Joints cannot "freeze"—but can properly expand and contract—so that rail-end batter is reduced. Labor that would ordinarily be required for servicing frozen joints, for building up worn rail ends and for replacing worn parts, can therefore be employed elsewhere.

3 **Giving Lifetime Protection:** Only one packing of joints with RMC Plastic is needed to prevent corrosion during the service life of the rails.

4 **Doing a BIG Job at Little Cost:** The low cost of RMC Plastic is trifling compared to the multi-protection it affords.

Moulded blocks of R.M.C. Plastic, 12-in. long, are laid on inner faces of joint bars before assembly—four for 4-hole joint, six for 6-hole.

Joint bars are applied in regular manner. Bolt threads are thoroughly coated with lubricant as the bolts are pushed through and taken up.

As the bolts are tightened, the pressure forces the plastic preservative compound into all voids in the joint area, packs them solidly.

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PITTSBURGH, PENNSYLVANIA

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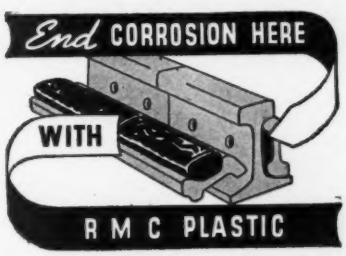
You Can Get *All* You Want *WHEN* You Want It!



of the Gulf Coast Lines (Missouri Pacific), with headquarters at Kingsville, Tex., was reported in the May issue, was born in Goliad county, Tex., on March 21, 1900, and entered railway service on December 10, 1921, in the bridge and building department of the St. Louis, Brownsville & Mexico (part of the Gulf Coast Lines) at Kingsville. In 1928 he was promoted to bridge and building inspector. In 1938, Mr. Bonner was appointed bridge and building foreman and a year later he was re-appointed bridge and building inspector, with headquarters as before at Kingsville, the position he held until his recent promotion, effective March 1. From 1934 to 1940, Mr. Bonner also served at various times as a relief roadmaster.

Bridge and Building

T. E. Jackson, supervisor of bridges and buildings on the Southern Pacific at Tuscon, Ariz., has been promoted to general bridge and building supervisor, a newly created position, with headquarters at San Francisco, Cal., and **E. H. Haase** has been appointed supervisor of bridges and buildings at Tuscon, succeeding Mr. Jackson. **M. G. Kirkpatrick** has been appointed supervisor of bridges and buildings at Los Angeles, Cal., relieving **L. R. McAllister,** whose appointment as acting roadmaster at Los Angeles is reported elsewhere in these columns.

John J. Caldwell, whose appointment as master carpenter of the Buffalo division of the Pennsylvania, with headquarters at Buffalo, N.Y., was announced in the June issue, was born on May 27, 1893, at New Florence, Pa. Mr. Caldwell graduated in civil engineering from the University of Pennsylvania in 1915. In June, 1916, he entered the service of the Pennsylvania as a chainman on the Philadelphia Terminal division, later serving as a rodman at various points and as a transitman in the office of the chief engineer maintenance of way at Philadelphia. Subsequently, Mr. Caldwell served as assistant supervisor of track at various points, as bridge inspector in the office of the chief engineer maintenance of way at Philadelphia, and as assistant master carpenter on the Middle and New York divisions. In 1923, Mr. Caldwell was promoted to master carpenter, serving in this position on the Delmarva, Wilkes-Barre and Williamsport divisions. Subsequently, he returned to the position of assistant master carpenter, serving in this capacity on the Wilkes-Barre division at Sunbury, Pa., until his recent promotion.

Robert Downard, whose appointment as supervisor of bridges and buildings on the Illinois Central, with headquarters at Paducah, Ky., was reported in the June issue was born at West Point, Ky., on February 18, 1898, and took correspondence courses in concrete engineering and civil engineering. He entered railway service on August 10, 1915, as a bridge and building laborer on the Iowa division of the Illinois Central and on April 1, 1916, he was promoted to carpenter. He was transferred to the Louisiana division on February 18, 1918, and a few weeks later he returned to the Iowa division as a bridge and building foreman. Mr. Downard was appointed a masonry inspector, with headquarters at Chicago on November 15, 1918, and on July 18, 1919, he was appointed a bridge and building foreman on the Springfield division. On January 10, 1921, he was appointed a carpenter on the Louisiana division and on August 7, 1922, he was advanced to masonry inspector at Chicago. Since July 5, 1938, until his recent appointment, effective May 7, Mr. Downard has been serving with the engineering department of the U. S. Government at Fort Knox.

Water Service

J. T. Seikel has been appointed water and fuel supervisor on the Southern Pacific at Dunsmuir, Cal., a newly created position.

John L. Mills, a chemical engineer employed as inspector in the water department of the Northern Pacific, with headquarters at Spokane, Wash., has been given a commission as a captain in the U. S. Army.

Obituary

Harold C. Hayes, assistant engineer on the Illinois Central at Champaign, Ill., died suddenly of a heart attack on June 12.

Joseph Marion Chandler, who retired in 1925 as roadmaster on the Missouri Pacific at Sedalia, Mo., died in the Missouri Pacific hospital at St. Louis on March 30 after an illness of three months.

Harold J. Roberts, assistant engineer on the Union Pacific at Portland, Ore., died at his home in that city on May 6 after a short illness. Mr. Roberts was at one time principal assistant engineer of the Oregon-Washington Railroad & Navigation Company (part of the Union Pacific).

Frederick W. Fratt, railroad construction engineer, died at Kansas City, Mo., on May 15. Mr. Fratt was born at Racine, Wis., on July 10, 1859, and attended the University of Wisconsin. He served on construction work for the Chicago & North Western in Minnesota, South Dakota and Iowa and then as resident engineer for the Wisconsin Central (now part of the Minneapolis, St. Paul & Sault Ste. Marie), later becoming chief engineer. In July, 1892, he went with the Missouri-Kansas-Texas on construction work, later becoming chief engineer in charge of the construction of various lines. In 1904 he supervised the construction of the M-K-T terminals at Kansas City, and he was the builder of the Armour-Swift-Burlington bridge at that point.

William Calmell Sloan, assistant vice-president and general manager of the Western lines of the Northern Pacific, with headquarters at Seattle, Wash., and an engineer by training and experience, died on June 6 at San Bernardino, Cal., while on a leave of absence because of poor health. Mr. Sloan was born at Brooklyn, N.Y., on July 9, 1886, and attended Cornell University. He entered railway service in February, 1907, as an inspector on the New York tunnels of the Pennsylvania and the following year he became connected with the Brooklyn Rapid Transit Company. On April 1, 1909, he entered the engineering department of the Northern Pacific as an inspector and later was promoted successively to bridge supervisor and roadmaster. In 1915, he was advanced to trainmaster at Forsyth, Mont., and two years later he was further promoted to division superintendent at Pasco, Wash., later serving successively as superintendent of the Rocky Mountain, Pasco, Yellowstone and Lake Superior divisions, assistant to the operating vice-president, and general manager of the lines east of Paradise, Mont. Mr. Sloan was appointed general manager of the system, with headquarters at St. Paul, Minn., and Seattle, Wash., in August, 1931, and in February, 1940, he was appointed assistant vice-president and general manager of the lines west of Livingston, Mont., with headquarters at Seattle.

Charles Sterling Millard, vice-president and general manager of the Big Four unit of the New York Central system at Cincinnati, Ohio, and an engineer by training and experience, died in that city on June 5 after an illness of four days. Mr. Millard was born at Louisville, Ky., on May 3, 1874, and graduated from the Sheffield Scientific School of Yale University in 1896. In the same year he became a rodman on the Pennsylvania, and in 1897 he was appointed an assistant in the engineering department of the Peoria & Eastern (part of the New York Central System), being advanced to assistant engineer in 1898. Following several months' service in the Spanish-American war, Mr. Millard returned to the P. & E. as engineer maintenance of way in October, 1899, later serving as second assistant engineer of the Delaware, Lackawanna & Western; engineer maintenance of way, of the Peoria & Pekin Union; assistant engineer on the Illinois Central at Memphis, Tenn.; as engineer maintenance of way, engineer of track and roadway of the Big Four; superintendent of the Michigan and Chicago division of the latter road, superintendent of the P. & E., and superintendent of the St. Louis division and assistant general superintendent of the Big Four. Mr. Millard was promoted to general manager of the Big Four in April, 1924, and on December 15, 1930, he was elected vice-president and general manager.

Charles Sterling Millard

(Continued on page 498)

DUFF·NORTON TRACK JACKS

Your best specification!

On guard against slow-ups in track maintenance work, Duff-Norton Track Jacks are the first choice of railroad men everywhere. Built to stand up under gruelling service day after day, these jacks are your *best* specification every time. For dependable, efficient, economical service, insist on genuine Duff-Norton Track Jacks.

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COATICOOK, QUEBEC

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Association News

Metropolitan Maintenance of Way Club

The annual outing of the club was held on June 25 at the Houvenkopf Country Club, Suffern, N. Y. The program included such sports as softball, horseshoes, quoits and golf, and prizes were awarded the winners in all activities. A buffet luncheon was served at noon.

Roadmaster's Association

With its annual convention on September 15-17, only 2½ months away, the Executive committee of the association will meet in Chicago on July 20 to review the work of the technical committees that are to report at the convention, and to make definite plans for the program for the convention itself. Copies of the 1941 Proceedings were sent to all members during the last month.

Bridge and Building Association

President R. E. Dove has called a meeting of the Executive committee in Chicago on July 27, at which time, in addition to taking up other business preparatory to the convention, to be held in Chicago on October 13-15, the chairman of the various technical committees will present for review preliminary drafts of the reports they are preparing for presentation before the convention. The 1941 Proceedings of the association are now in the hands of the binder and will be distributed to members about the middle of July.

Track Supply Association

Plans for the annual exhibit of the association, to be held at the Stevens Hotel, Chicago, on September 14-17, were brought nearer completion at a meeting of the Board of Directors of the association in Chicago on June 22. Indicating the desire on the part of the association's member companies to be of greatest service to maintenance officers in the solution of their war-time problems as affected by track materials, tools and work equipment, 38 companies have already made application for 55 spaces at the exhibit. Further applications should be addressed to Lewis Thomas, secretary-treasurer, Track Supply Association, 59 E. Van Buren street, Chicago.

The companies that have made application for space to date include:

Air Reduction Sales Company, New York
American Fork & Hoe Co., Cleveland, Ohio
Barco Manufacturing Co., Chicago
The Buda Company, Harvey, Ill.
Chipman Chemical Company, Inc., Bound Brook, N.J.
Creepcheck Company, Inc., Pittsburgh, Pa.
Crerar, Adams & Co., Chicago
Cullen-Friestedt Co., Chicago
The Duff-Norton Mfg. Co., Pittsburgh, Pa.
Elastic Rail Spike Corp., New York
Electric Tamper & Equipment Co., Ludington, Mich.
Fairmont Railway Motors, Inc., Fairmont, Minn.
Hayes Track Appliance Co., Richmond, Ind.
Illinois Malleable Iron Co., Chicago
O. F. Jordan Co., E. Chicago, Ind.
Kalamazoo Railway Supply Co., Kalamazoo, Mich.
Lundie Engineering Corp., New York
Maintenance Equipment Co., Chicago
Mall Tool Co., Chicago
Morden Frog & Crossing Works, Chicago
Murdock Mfg. & Supply Co., Cincinnati, Ohio
Nordberg Mfg. Co., Milwaukee, Wis.
The Oxweld Railroad Service Co., Chicago
The P. & M. Company, Chicago
Pettibone-Mulliken Corp., Chicago
Pocket List of Railroad Officials, New York
Positive Rail Anchor Co., Chicago
The Q & C Company, New York
The Rail Joint Co., Inc., New York
The Rails Company, New Haven, Conn.
Railway Engineering and Maintenance, Chicago
Railway Maintenance Corp., Pittsburgh, Pa.
Railway Purchases and Stores, Chicago
Railway Track-Work Co., Philadelphia, Pa.
Sperry Rail Service, Hoboken, N. J.
Templeton, Kenly & Co., Chicago
Woodings Forge & Tool Co.
Woodings-Verona Tool Works, Verona, Pa.
Woolery Machine Co., Minneapolis, Minn.

American Railway Engineering Association

In recent months, to cope with the many new and urgent problems confronting railway engineering and maintenance men as the result of the war, and particularly those problems arising from the scarcity of critical materials, the American Railway Engineering Association (acting as the Construction and Maintenance section of the Association of American Railroads) has developed and adopted a number of innovations in organization and procedure which have already contributed in a substantial way to the war effort of the country, while insuring that the essential engineering needs of the railways will not be entirely overlooked. Of greatest importance among these innovations, and the key to the dispatch with which the association is prepared to make recommendations and to act upon those of others, is an arrangement which provides for "emergency committees" of four to six men, each to represent particular standing committees or groups of committees of the association, with power to submit recommendations in the interest of the war needs of the country—and an emergency committee of four men from the Board of Direction, representing the Committee of Direction of the Construction and Maintenance section, which has the authority to promulgate and adopt emergency measures for the association, for the duration of the war.

Other measures which have been provided for in the new set-up, and which have already been taken, include the adoption of "emergency provisions" affecting certain of the specifications in the Manual of Recommended Practice of the association, and the issuance of circular letters to the chief engineering officers of the railways promptly as occasion demands, to the end that the recommendations of the various emergency committees will be put into effect with minimum delay. Still another function being performed by the association is to serve as a reservoir from which to recruit members for special committees appointed at the request of C. H. Buford, vice-president, Operations and Maintenance department, A.A.R., to perform special services, usually on short notice and with the greatest speed.

Under the new plan of action adopted by the association, recommendations for emergency action initiated by any of the standing committees, or acted upon by them at the request of others, will be referred to the appropriate emergency technical committee and, upon ratification by that committee, will be referred to the emergency committee representing the Board of Direction for approval. The emergency committees also stand ready to deal with various special assignments. Some of the recommendations that have already been promulgated by the association under the new arrangement in the interest of material conservation, substitution, simplification and reclamation, are contained in an article elsewhere in this issue.

Six standing committees of the association held meetings during June, and three such committees plan meetings during July. The committees which met in June were Buildings, at Richmond, Va., on June 9 and 10; Roadway and Ballast, at Chicago, on June 15 and 16; Records and Accounts, at Cincinnati, Ohio, on June 16 and 17; Economics of Railway Location and Operation, at Cleveland, Ohio, on June 18 and 19; Water Service, Fire Protection and Sanitation, at Chicago, on June 23; and Yards and Terminals, at Buffalo, N. Y., on June 24.

The committees which have scheduled meetings in July are Waterproofing, which will meet at Chicago on July 8; Iron and Steel Structures, which will meet at Cleveland on July 9 and 10; and Maintenance of Way Work Equipment, which will meet at Richmond, Va., on July 16 and 17.

The 1941 Proceedings, reporting the activities of the convention of the association last March, as well as the loose-leaf supplements to the Manual, were distributed to members during the last month. Early in July, members will receive the June-July Bulletin, No. 432, features of which will include the preliminary report of the Committee on Ties, containing statistics relative to 1941 tie renewals; a joint paper by G. M. Magee and E. E. Cress, research engineer and assistant engineer of tests, respectively, of the Engineering division, A.A.R.; and a statement by Secretary Lacher detailing the emergency measures adopted by the association to enable it to deal most effectively with the problems confronting engineering and maintenance men as the result of the war.

Supply Trade News

General

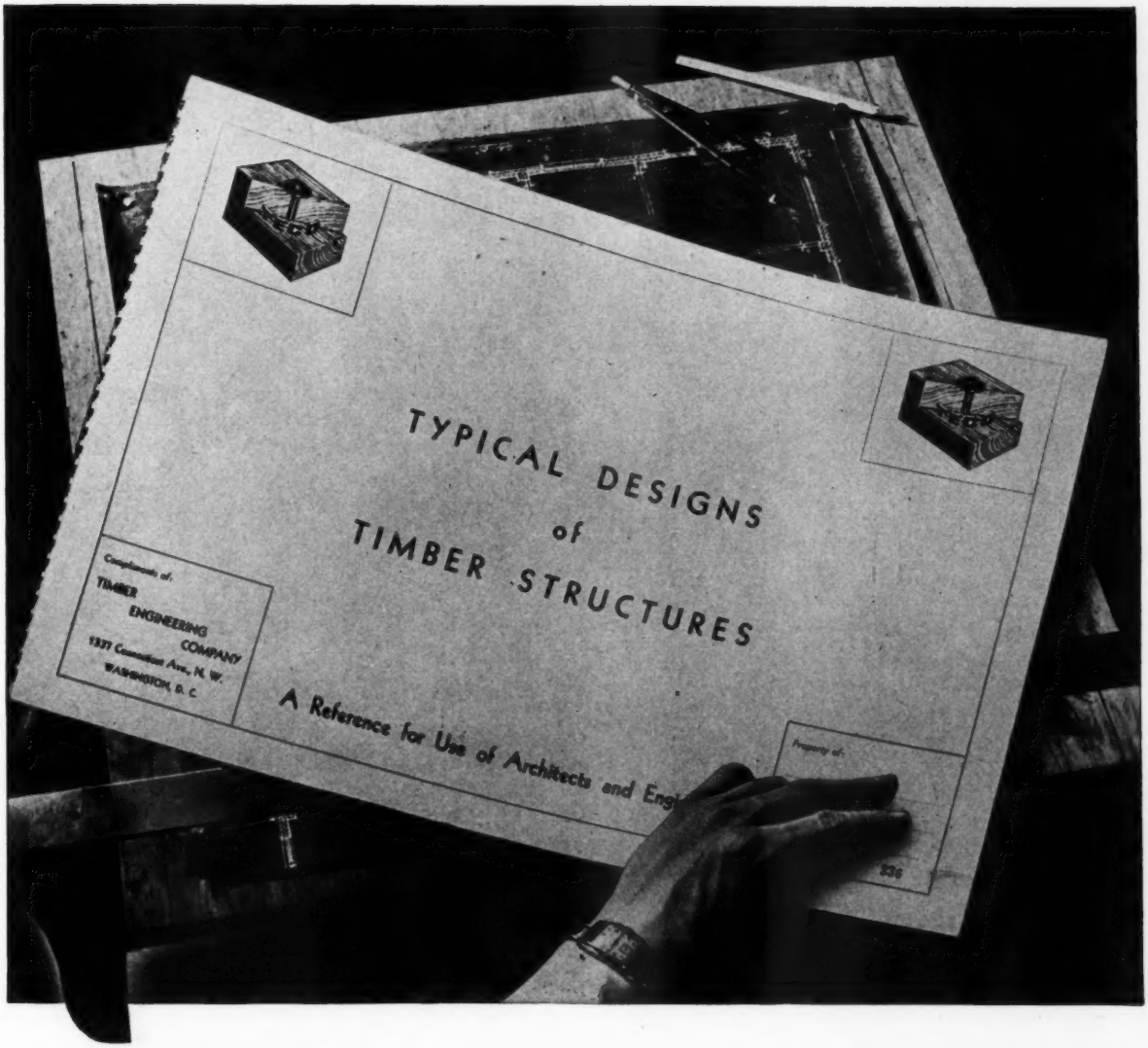
The Navy "E" burgee was presented to the **Nordberg Manufacturing Company,** Milwaukee, Wis., on May 15 for production achievements. The presentation was made by Rear Admiral W. H. P. Blandy, chief of the Bureau of Ordnance, and was accepted by Robert E. Friend, president of Nordberg. Employees were presented Navy "E" emblems by Captain H. A. Spanagel, of the U. S. Naval Gun Factory, Navy Yard, Washington.

Personal

C. F. Green of **Fairmont Railway Motors, Inc.,** Fairmont, Minn., has been granted a leave of absence for the duration and is now serving in the industrial machinery division, transportation section, of the War Production Board at Washington, D.C.

William M. Black, president of the **American Manganese Steel Division** of

(Continued on page 500)



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As yet I haven't received *Typical Designs of Timber Structures*. Please rush my copy.
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the **American Brake Shoe & Foundry Co.**, Chicago Heights, Ill., has also been elected vice-president of the American

William M. Black

Brake Shoe & Foundry Co., New York. Mr. Black joined the American Manganese Steel Division in 1912 and became its general sales manager in 1934 and vice-president in 1935. He was elected president in 1940 and will continue in that capacity. He served as a lieutenant of ordnance in World War I.

McClure Kelley, vice-president and treasurer of the **Austin-Western Road Machinery Company,** Aurora, Ill., has been elected president to succeed **Samuel F. Beatty,** who has been elected chairman of the Executive committee, effective August 1. Mr. Beatty has been associated with the company for 43 years, the last 15 years as president. Mr. Kelley began

McClure Kelley

his association with the company in 1929 as assistant treasurer and was promoted to treasurer in 1931. In 1940 he was elected vice-president and treasurer.

Harry C. Beaver, president of the Worthington Pump & Machinery Corporation, has been elected president of the **Worthington-Gamon Meter Company** to succeed the late **E. T. Fishwick. R. R. Anderson,** treasurer and manager of the Worthington-Gamon Meter Company has been elected a vice-president and director.

James S. Hearons, assistant manager of sales of the Railroad division of the **Inland Steel Company,** Chicago, has been given a leave of absence, effective June 8, to enable him to serve with the Production division of the War Production Board in Washington. He will work in a consulting capacity as liaison between the railroads and the Board.

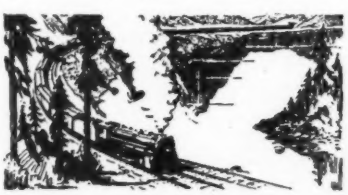
Roy P. Williamson, sales manager of the Industrial Jobber division of the **Buda Company,** Harvey, Ill., has been appointed sales manager of the Railroad division, with headquarters as before at Harvey. Mr. Williamson was born at Washington Courthouse, Ohio, on June 8, 1904, and attended the University of Michigan. In 1928 he went with the Industrial Brownhoist Corporation at Chicago as a sales engineer and in 1932 he went with the Shaw-Box Crane division of Manning, Maxwell & Moore, Inc., as assistant manager of the Chicago office. Four years

Roy P. Williamson

later, he became associated with the Gustin-Bacon Manufacturing Company in the same capacity and in 1940 he went with the Buda Company as sales manager of the Industrial Jobber division.

John S. Hutchins, district sales manager of the **Ramapo Ajax Division** of the **American Brake Shoe & Foundry Co.,** has been promoted to sales manager, with headquarters as before at Chicago, in charge of all sales of this division with the exception of those on the West Coast and at Pueblo, Colo., which will be under the jurisdiction of **H. W. Renick,** vice-president. **J. P. Kleinkort,** representative at East St. Louis, Ill., has been transferred to New York. **E. F. Needham,** representative at Pueblo, Colo., has been transferred to Chicago and **W. Muller,** representative at Los Angeles, Cal., has been transferred to Pueblo.

Mr. Hutchins was born at Arlington, Mass., on December 30, 1904, and after attending Yale University entered the employ of Ramapo Ajax at Chicago in Sep-



tember, 1925. Two years later he was transferred from the plant to the sales department and in 1930 was moved to the

John S. Hutchins

Cleveland office. In 1933 he was placed in charge of sales in the Chicago district, being promoted to district sales manager in charge of the entire Middle West territory in 1941.

Obituary

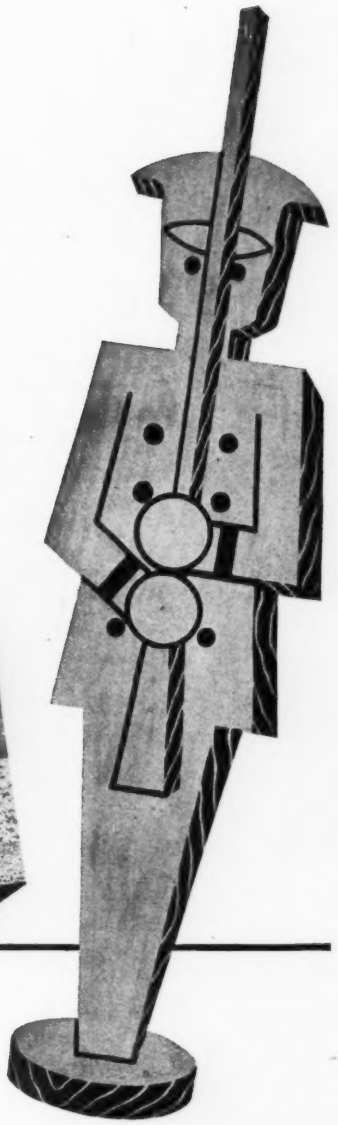
Thomas G. Windes, service engineer of the National Aluminate Corporation, Chicago, died in Evanston, Ill., on May 19 of a heart ailment.

Philip D. Block, chairman of the executive committee of the Inland Steel Company, Chicago, died in the Presbyterian hospital in that city on June 30. Mr. Block was born at Cincinnati, Ohio, on

Philip D. Block

February 16, 1871, and after graduating from high school in 1888, joined the Block-Pollak Iron Company, Cincinnati and Chicago, of which has father was senior partner. In 1893, he became one of the founders of Inland, which was organized on October 3 and incorporated on October 30, and was elected treasurer and a director. Eight years later, he was elected first vice-president and on July 29, 1919, was elected president of the company. He held this position until April 30, 1941, when he became chairman of the executive committee of Inland Steel Company.

WOODEN PIPE



OR WOODEN GUNS?

Naturally tanks, guns and ships come first. Steel must not be used in any drainage structure except where engineering integrity demands it. Yet ARMCO Emergency Wood Pipe offers a practical war-time substitute.

This completely new design in wood pipe requires no steel sheets and bands, wire mesh, metal reinforcing or other critical materials. It is easy to handle and has ample strength to meet engineering standards. ARMCO Emergency Pipe is designed to outlast the 5 to 10-year period for which most military construction is intended. On more permanent installations, when replacement becomes necessary, a corrugated metal pipe may easily be threaded through or jacked around the wood structure.

Remember that ARMCO Corrugated Metal Pipe is only on temporary "leave of absence." It will be back with its flexible strength, ease of handling, tight joints, long lengths, and low installation costs. Asbestos Bonded Coatings and thick bituminous pavements will be back too—better than ever before—to guard against corrosion-erosion.

Meanwhile, perhaps we can assist with your drainage problems. The answer may be in the use of non-strategic materials, or suggestions for repairing and salvaging older structures. Write us. Armco Railroad Sales Co., Incorporated, 2231 Curtis Street, Middletown, Ohio.

ARMCO ARMCO **Emergency Pipe**

New Target for Industry:

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TO WIN THIS WAR, more and more billions are needed and needed fast—AT LEAST A BILLION DOLLARS A MONTH IN WAR BOND SALES ALONE!

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If your firm has already installed the Pay-Roll War Savings Plan, *now is the time*—

1. To secure wider employee participation.
2. *To encourage employees to increase the amount of their allotments for Bonds, to an average of at least 10 percent of earnings—because "token" payments will not win this war any more than "token" resistance will keep the enemy from our shores, our homes.*

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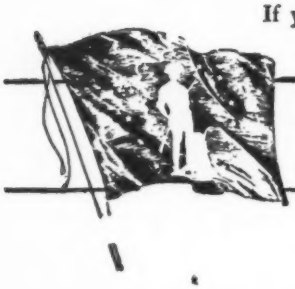

U. S. War Savings Bonds

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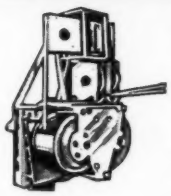
with LeTourneau Equipment



Looking for new ways to increase efficiency of your tractors and manpower? LeTourneau Off-Track Equipment—Dozers, Carryall Scrapers and Cranes—can help. All three are quickly and easily interchangeable on one track-type tractor equipped with a LeTourneau 2-drum Power Control Unit to enable you to do a full range of rail maintenance jobs. For instance . . .

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2. Carryall Scrapers speed construction of new right-of-ways, eliminate snow hazards, dig drainage ditches, make emergency roadbed repairs, level land for new buildings.

3. LeTourneau Tractor Cranes set structures, help clear away wreck damage, handle rails and ties, load and unload heavy machinery and supplies with a minimum of time and cost.

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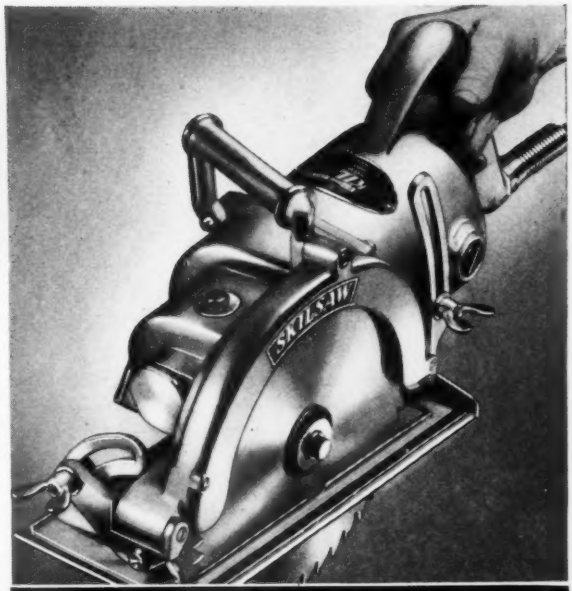

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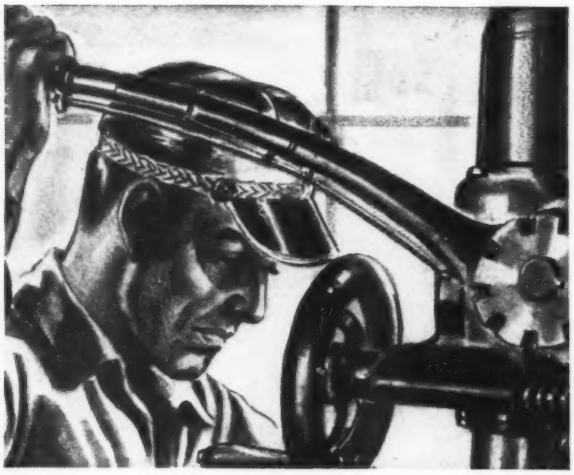
MAKE AMERICA'S HANDS MORE PRODUCTIVE



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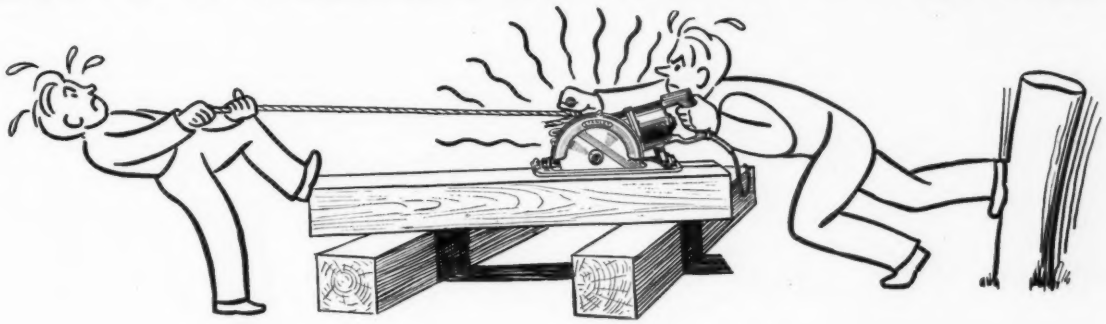

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Overloading an Electric Saw puts a strain on the motor, reduces its efficiency, and soon puts it out of action for costly repairs. Most overloading is caused by forcing dull blades. Keep them sharp. Have the blade running full speed before contacting the work. Keep the blade at high speed for faster, smoother cutting and lower current consumption.

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STANLEY
Electric Tools

KEEP 'EM ON THE JOB WITH PROPER CARE

FAST TRAVEL SPEED REDUCES OPERATING COSTS

TSA Railway Track-Work Exhibitors Association
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SEPT. 14-17 1942

● Burro Cranes make time on track laying and track maintenance. They're quick on handling and fast on moving. Dependable, too, as any man who runs one will tell you. The facts are in our bulletins which you should have.

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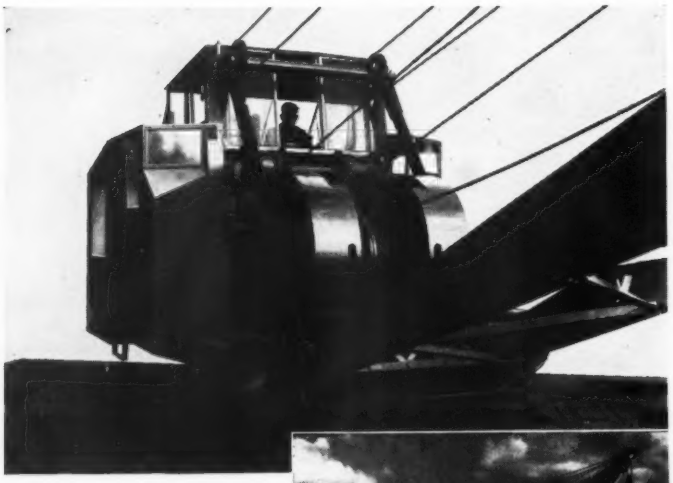

With Monitor-type cabs there are no blind spots to retard the operator's efficiency. He has a clear view in every direction.

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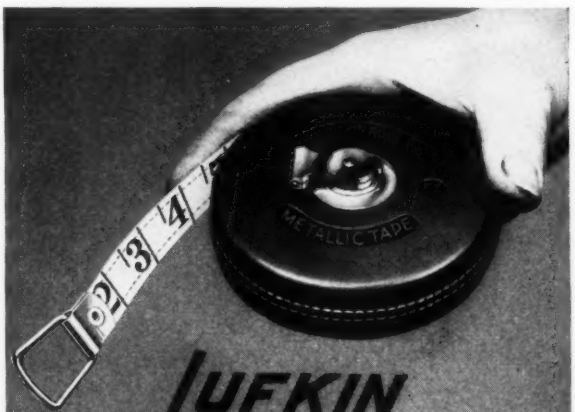

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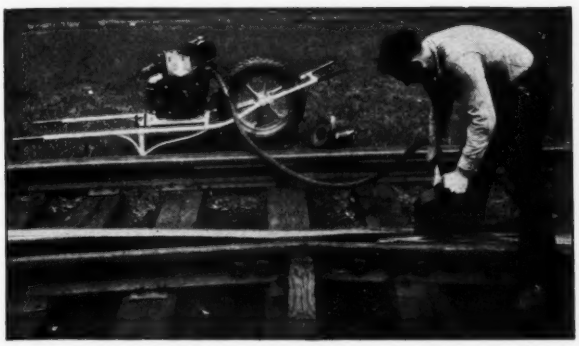

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Railway Track-work Co.

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Simplex G-Y Tie Spacer
Helps Keep 'Em Rolling

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Units made in four sizes to fit standard rails. They are designed so that the pressure on the tie is centered insuring maximum push and eliminating tie damage.

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THE Q & C COMPANY

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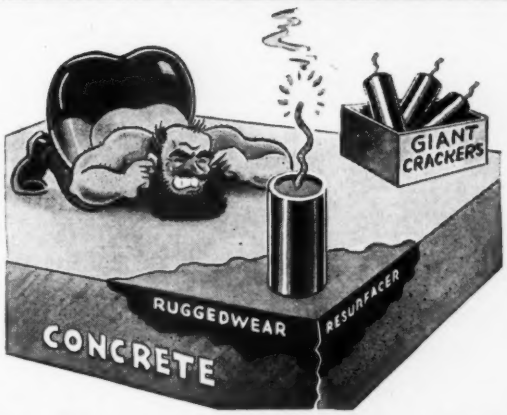

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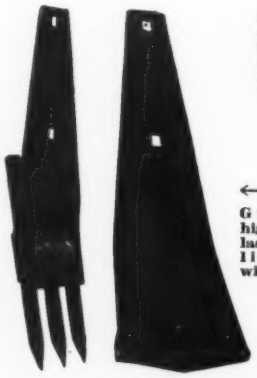
Gravel or Rock Blade, 6" wide, ¾" tip, for tamping ballast not more than 1" in size, crushed slag or gravel.

U-609 →
Adjustable Digging Blade, for skeletonizing, digging and cleaning ballast. A versatile blade for operations where pick would be used.



U-607 →
Pick Tamping Blade, deeply penetrating teeth prevent angular materials from locking and arching before voids under ties are filled.

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Gravel Blade for high lifts, all ballasts; for low lifts in light ballasts, 9" wide with ¾" tip.

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If you haven't received our new maintenance booklet we will be glad to send you one.

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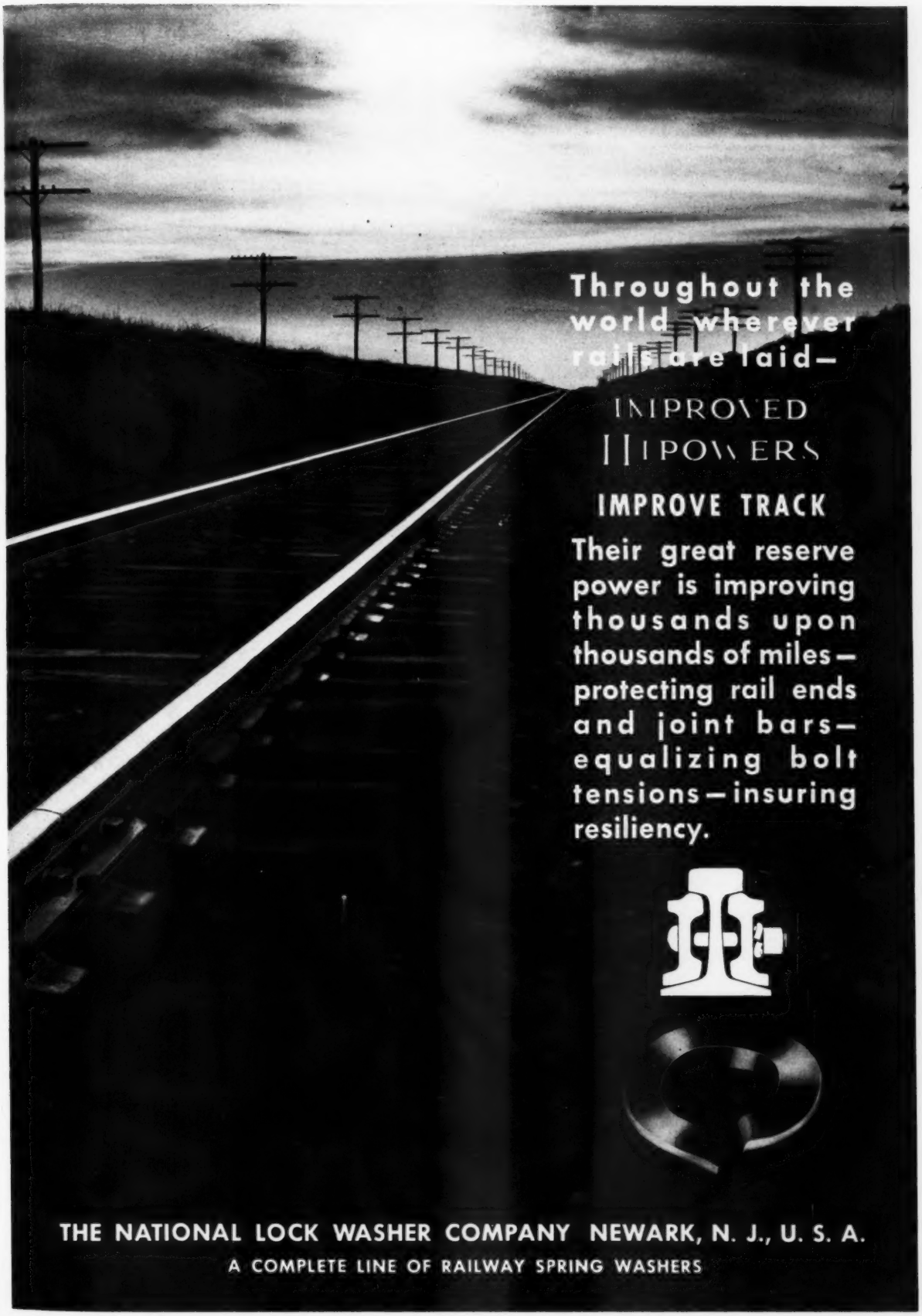
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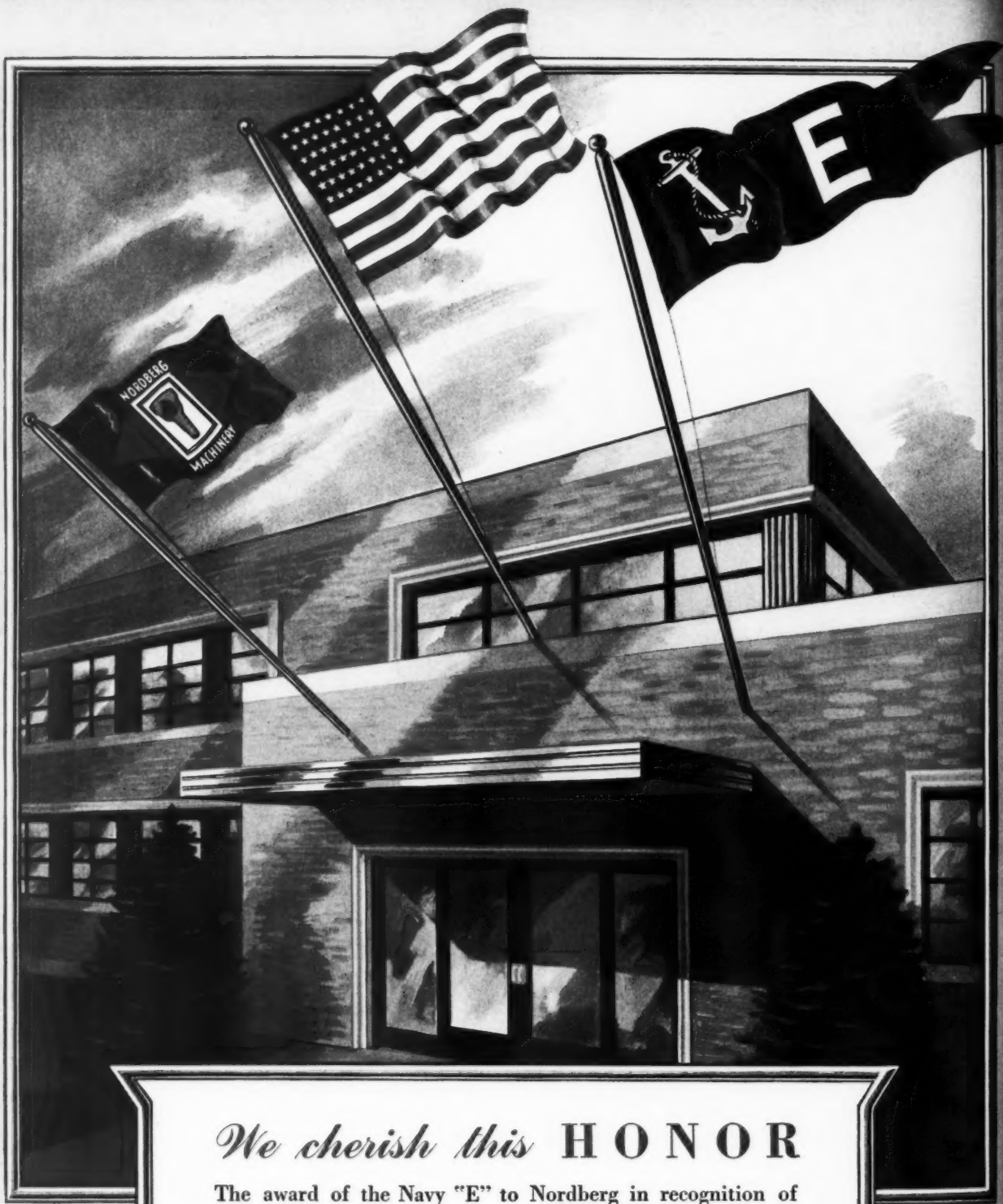

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